

A crack in the facade? Situating Singapore in global flows of electronic waste

Josh Lepawsky¹ and Creighton Connolly²

¹Department of Geography, Memorial University of Newfoundland, Newfoundland, Canada

²School of Environment, Education and Development, University of Manchester, Manchester, United Kingdom

Correspondence: Josh Lepawsky (email: jlepawsky@mun.ca)

Singapore is alleged to be a key node in global flows of e-waste prohibited under the Basel Convention. We combine a close reading of the Convention and related documents with findings from nonparticipant observation of and interviews with Singapore-based traders of discarded electronics. The case offers both important conceptual and empirical findings for future studies of territory in market-making activity. Conceptually, our research suggests that it may be analytically useful in such studies to conceptualize territory without presupposing that it is generated as a result of separate domains or logics such as 'the political' or 'the economic'. Empirically, we find that the regulatory framework of the Convention, combined with the action of traders based in Singapore, generates a territorialization of the city-state such that it operates as a crack in the regulatory edifice of the Convention, even as Singapore lawfully fulfils its obligations to it. Moreover, allegations premised on the role of Singapore as a facilitator of global e-waste dumping misrepresent its crucial role as a conduit of electronic equipment for the significant reuse markets elsewhere in Southeast Asia and beyond. The case indicates that the allegations against Singapore hinge on the city-state being territorialized as a 'developing country'.

Keywords: Basel Convention, electronic waste, Singapore, territory

Territory is a word, a concept, and practice, and the complicated relation between these three terms can only be grasped with historical, geographical, and conceptual specificity (Elden, 2013: 328).

The Parties to the Convention [...] *Fully recognizing* that any State has the sovereign right to ban the entry or disposal of foreign hazardous wastes and other wastes in its territory [...] HAVE AGREED AS FOLLOWS [...] (Basel Secretariat, 2011a, emphasis original).

Introduction

Singapore is alleged to be a key node in the global networks of trade and traffic that move discarded electronics around the planet (Basel Action Network, 2002; Schwarzner *et al.*, 2005). The city-state is also a party to the Basel Convention on the Transboundary Shipment of Hazardous Waste (hereafter the Basel Convention or, simply, the Convention), which is the primary international treaty that regulates international shipments of hazardous waste. The Convention is premised on a particular notion of territory that divides parties to the Convention into two groups. One group, Annex VII parties (comprising the Organization for Economic Cooperation and Development (OECD), the European Community (EC) and Lichtenstein) is proscribed from exporting hazardous waste to the other group, non-Annex VII parties (all other signatories). Singapore, a non-Annex VII party, is alleged to be a territory that plays a key role in facilitating global flows of electronic discards between Annex VII and non-Annex VII parties.

The Basel Secretariat has launched several studies focused on investigating the 'e-waste' trade and oversees expert technical working groups devoted to deliberations over the status of electronic discards under the Convention (Basel Technical Working Group, 1992; Basel Secretariat, 1994b; Basel Secretariat, 2011c). Under some circumstances the designation 'hazardous waste' characterizes discarded electronics that are traded and trafficked for many purposes including reuse, repair, refurbishment and repurposing, as well as component recovery, recycling and disposal. While discarded electronics are only one among several categories of hazardous wastes that are regulated by the Convention, the trade and traffic in these materials have become a special matter of concern over the last decade.

In situating the territorialization of Singapore under the Basel Convention, we do not claim that the Convention specifically, or environmental regulation more generally, makes territory in toto. Instead, following work by Elden (2010; 2011; 2013), Painter (2010) and others (e.g., Berndt & Boeckler, 2010; Gregson *et al.*, 2013; Christophers, 2014b; Kama, 2015), we claim that Singapore's status as a non-Annex VII party to the Convention is a territorializing effect of regulatory action at work in the Convention and its attendant policy documents. At the same time we argue that the existing outflow of electronic discards from Singapore highlights its role as a fissure in the Convention's regulatory edifice of territory—a crack in the facade. From this observation, we point to some broader questions about territory that might usefully direct future analyses in the emerging literature on the territorialization of markets for waste (e.g., Gregson *et al.*, 2012; 2013; 2015; Kama, 2015).

Our paper is organized as follows. The first empirical section examines how the Convention articulates territory. The section relies upon a close reading of publicly available documents from the Basel Secretariat. The documents selected for analysis include the Convention itself and various reports and technical briefings related to the adoption of Annex VII of the Convention in 1995. As discussed in more detail below, while Annex VII has been adopted by the Basel Convention's Conference of the Parties (COP), the annex is not yet in legal force, because it has not yet been ratified by a sufficient number of parties to the Convention. Nevertheless, the territorial designations made in Annex VII strongly colour the legal and policy interpretations of the Convention's regulation of transboundary shipments of hazardous waste.

The second empirical section of the paper principally draws on material collected during fieldwork in Singapore between May and August of 2011 and was premised on a follow-the-thing approach (Cook, 2004; Crang & Cook, 2007). Briefly, follow-the-thing methodologies entail ethnographies of the particular, localized networks that assemble the object under study as a 'global thing'. Thus, through following the various connections associated with discarded electronics in Singapore, we were able to trace the trade and business networks in the city-state that facilitate the trade in discarded electronics throughout the Southeast Asian region and beyond.

This latter part of the research included nonparticipant observation and semistructured interviews with 26 different individuals involved in the management and trade of electronic discards in and through Singapore. Interviewees included regulatory authorities, local electronics recyclers and foreign traders (all names are pseudonyms). The bulk of the work was conducted with traders based in Singapore's Little India district, where there is a clustering of used electronics shops catering mostly to foreign traders. Our fieldwork identified a thriving international trade in electronic discards from Singapore. The high per capita wealth of Singaporeans, coupled with the large presence of firms in the finance, insurance and real estate sector, means substantial

amounts of high-quality electronic discards arise domestically in Singapore. Also, the city-state's status under the Convention and its bi- and multilateral trade agreements mean electronic discards can easily flow to Singapore from abroad.

We conclude with a brief discussion of three key points. First, territorialization of Singapore under the Convention hinges on it being construed as a 'developing country'. Second, while we concur with Elden (2013) and others that territory is a result of particular and contingent ways of conceptualizing and calculating space, we also suggest it is analytically useful to hold in abeyance any presupposition of territory as a particular type of technology (e.g., a political or economic one). Doing so, we suggest, would help the study of territory account for both the making of territory and for the qualification of it as a particular type of technology.

Conceptualizing the territorialization of waste

It has long been recognized that waste making, value making and space making are mutually constitutive processes (e.g., Douglas, 1966; Thompson, 1979; Lynch, 1990; Gille, 2007; Gidwani, 2012; Goldstein, 2013). Geographers interested in the territorialization of waste and other externalities (e.g., Gregson *et al.*, 2012; 2013; 2015; Kama, 2015) have recently drawn on the geographies of marketization literature (e.g., Berndt & Boeckler, 2010; Christophers, 2014b) to explicate the building of spatially confined markets for the trade and management of waste and its retransformation into value. The notion of spatially confined markets for waste trading and management are relevant to the case of Singapore and the Basel Convention. The Convention divides its parties into two blocs of signatories, Annex VII and non-Annex VII; it prohibits hazardous waste trading *from* Annex VII *to* non-Annex VII parties, while permitting such trade *within* each bloc (i.e., within Annex VII or non-Annex VII, see Lepawsky, 2015a). Thus, under the Convention the trade in hazardous waste is to be confined to markets within each territorial designation, Annex VII or non-Annex VII. As we discuss in subsequent sections, Singapore does not fit neatly into the Convention's binary geographical edifice. Consequently, we argue, the city-state is a significant crack in the facade of the Convention's territorially defined markets. Furthermore, the making of these territorial blocs of signatories signals a particular and contingent operationalization of territory within the Convention's regulatory texts.

For Gregson *et al.* (2013), marketization, waste and the building of spatially confined markets are linked through specific market devices (e.g., those for assaying the metal content of ships for recycling) made relevant, because of the political work of changing supranational governance regimes (in the form of regulation or legislation). In Gregson *et al.*'s (2013) case, those governance regimes were themselves jump-started by NGOs (nongovernmental organizations) and media exposés of the global shipbreaking industry. Gregson *et al.* (2013) argue that their work enriches the marketization literature in two ways (for useful introductions to the notion of marketization, see Çalıřkan & Callon, 2009; 2010). First, they document a different set of devices (i.e., assay infrastructure) at work in the making of markets than those identified by others in the marketization literature, such as computer algorithms or the architectural arrangement of bidding spaces (e.g., Beunza *et al.*, 2006; MacKenzie, 2006; Callon *et al.*, 2007). Second, Gregson *et al.* (2013) suggest that their case demonstrates how the marketization of recycling is not just an economic activity, but also a political one. Thus, their case confirms the marketization literature's argument that markets are achievements, but goes further by demonstrating

that 'recycling's economization within spatially bounded markets is not a matter of economic activity becoming political but rather of always being political' (Gregson *et al.*, 2013: 20).

Gregson *et al.* (2013) convincingly show that 'the political' is in operation as a spatially bounded market for recycling ships gets built. Yet they do so at the expense of claiming that the economic activity of marketization is always political. If it is thus, then describing marketization as 'political' risks being a redundancy, because Gregson *et al.* (2013) skip over the challenge of tracing what generates their explicans ('the political'). Instead, they gift the explanatory power of 'the political', by allowing it to have always already been there to do the explaining. Moreover, the marketization literature may not be so blind to the political as Gregson *et al.* (2013) suggest, even if it might be argued that the literature has yet to sufficiently document the role of the political and power in the making of markets. For example, in a key marketization text Çalıřkan (2010: 189) argues that the global market for cotton is 'a field of power' in which the 'realization of the price is a relation of power in itself'. But this is not just a rehearsal of political-economy. For Çalıřkan, 'this universe of the market [...] cannot be analytically located by imposing boundaries that attach categorically separate logics of economics, scientific, social, or political encounter' (Çalıřkan, 2010: 187). Meanwhile, Berndt (2013) uses the economization approach to engage directly with explicating power and the politics of violence necessary to the territorialization of markets-in-the-making in Ciudad Juarez, Mexico. Arguably, a crucial difference exists between Gregson *et al.*'s (2013) approach and that of others in the marketization genre such as Çalıřkan (2010) and Berndt (2013). For Çalıřkan (2010), there are no separate domains or logics (e.g., of culture, politics, economics, technology, science, society) except to the extent that those domains or logics are produced 'by the researchers who assume independent spheres of life in the struggle to make a global market' in advance of doing their research (Çalıřkan, 2010: 187). Thus, rather than being ill suited to accounting for politics in the making of markets, marketization theorists understand action and its subsequent retrospective qualification as this or that type of activity (e.g., economic, political, cultural, etc.) to be their core research interest (Çalıřkan's point is shared by other marketization literature, e.g., Barry *et al.*, 2002; Callon, 2007; 2010; and more broadly in the theoretical precepts of actor-network theory, e.g., Mol, 1998; Latour, 2013; see also Cochoy *et al.*, 2010 and accompanying articles for an overview of the issue of politics in marketization). In short, the economic and the political (among other possible qualifiers of action) are arrival points, not departure points, for these thinkers. They are, in other words, second-order effects just as territory is such an effect for Elden (2013) and Painter (2010).

Drawing on Boeckler and Berndt (2012) and Çalıřkan and Callon (2010), Kama (2015) examines an instance of market making for discarded electronics geared toward instantiating a spatially bounded market within the European Union (EU). The territorialization of this market-in-the-making is envisioned as a 'circular economy', yet to date its circularity remains imperfectly emplaced (cf. Gregson *et al.*, 2015), because two-thirds of electronic products placed on the EU market remain unaccounted for in regulatory calculations of EU waste electrical and electronic equipment. These uncounted masses are assumed by the authorities to have dissipated out of the EU through regulatory loopholes and gaps and thus necessitate further action to shore up the territorialized circular economy. Kama (2015) shows that the spatial imaginary of a 'circular economy' is fundamental to the work of making a spatially bounded market territory—it provides a meaningfully useful image for policy makers to deploy when framing the collective experiment of governable action that is the EU. These findings lead Kama (2015) to

conclude, like Berndt (2013) and Christophers (2014b), that territorialization is a fundamental aspect of making markets, i.e., to marketization. Thus, drawing on key geographic thinkers of territory (e.g., Painter, 2010; Elden, 2013), Kama (2015: 6) understands the 'economic territory' of the EU to be both a particular socio-technical arrangement and a political technology related to the EU's desire to build a circular e-waste economy, rather than a pre-extant bounded unit.

Notwithstanding their differences, a commonality across the above works, engaging with market making and the territorialization of waste within spatially confined markets, is an understanding of territory to be a result of action. This understanding accords with a series of recent publications by Elden (2010; 2011; 2013), who argues that territory can be usefully approached as a result of historically and geographically situated ways of understanding relations between power and place. How those relations are conceptualized and practised generates the modern association of territory with the sovereign state as a political technology. One of the significant insights that follows from Elden's work is that territory is a result of a host of conceptual and practical economic, strategic, legal and technological practices becoming amalgamated together, rather than a relatively straightforward way of describing space with boundaries around it. In short, territory is a second-order effect of particular and contingent ways of conceptualizing and calculating space.

Elden's approach to territory is genealogical in Foucault's sense of the term. Such an approach is about understanding the conditions that make possible things as they are. Thus, Elden's interest in territory is not in providing a universal, transhistorical definition of it. Instead, his object of analysis is the situations in which particular notions and practices of territory emerged, which he examines through an historical excavation of their conditions of possibility. For Elden, any actually existing notions and practices of territory are a relational result of those conditions of possibility. In line with Elden's position, Painter (2010) offers three potentially useful concepts for analyses of territory: contiguity, continuity and boundedness. Drawing on a case study of English administrative regions, Painter (2010) shows how all three concepts are relationally in play with one another. Their collective effect is to provide a policy framework that generates these administrative regions as policy objects arranged in part-whole relationships. Organized as such, the administrative regions are understood to be internally undifferentiated and coherent governable regions of space that are distinguishable from one another. They are thus contiguous, continuous and bounded. What is of interest to Painter, like Elden, is an undoing of the presumption that territory is an extant container. Instead, for Painter (2010: 1116) territory is 'a porous, provisional, labour intensive and ultimately perishable and non-material product of networked socio-technical approaches'. Territory, in other words, does not exist in itself; rather an ecology of socio-technical practices enact it into existence.

Elden's and Painter's work on territory are complementary but different. Both understand territory to be a relational result of concepts and practices becoming amalgamated together in action. What distinguishes their work from each other is the object of inquiry. For Elden, the focus is on understanding the conditions of possibility that enable certain notions and practices of territory thinkable and doable. For Painter, the issue is to understand the socio-technical practices that generate specific versions of territory.

As we discuss in the next section, under the Basel Convention individual parties become policy objects arranged as individual sovereign states that are members of one of two territorial categories under the Convention: Annex VII or non-Annex VII parties, with the latter prohibited from receiving discarded electronics from the former when

those electronics are deemed to be hazardous waste. This prohibition is due to a presupposition that non-Annex VII parties are unable to responsibly handle imports of hazardous materials, despite large differences in industrial capacity within this bloc of signatories. Furthermore, drawing on the work of Elden, Painter and others (e.g., Berndt & Boeckler, 2010; Gregson *et al.*, 2013; Christophers, 2014b; Kama, 2015), we suggest how territory is an effect of the environmental regulation of the Basel Convention. While a deep genealogical excavation of the Basel Convention's version of territory is beyond the scope of our paper, we do illustrate some evidence of the conditions that made Basel signatories thinkable and doable as Annex VII versus non-Annex VII territories. We also highlight evidence of some of the socio-technical practices that assemble the regulatory space of the Basel Convention as territorialized units of signatories comprised of spatially bounded markets for the transboundary movement of hazardous waste.

The Basel Convention and territory as effect

The Basel Convention is an international treaty negotiated under the auspices of the United Nations Environmental Programme (Kummer Peiry, 1995). The Convention entered into legal force on 5 May 1992 and currently includes 183 parties, of which 53 are full signatories. Negotiations toward the Convention began in 1987. They were originally framed in relation to international law governing ocean dumping (Basel Secretariat, 1989) in part as a response to media exposés of waste dumping at sea and in various countries of Africa, Asia and Latin America (see Wynne, 1989; Moyers, 1990; Clapp, 2001; Lepawsky, 2015a;). Singapore acceded to the Convention on 2 January 1996 (Basel Secretariat, 2011b).

A close reading of key Convention texts shows that they articulate a vision of territory derived from a distinct, locatable and historically specific conceptualization of signatories. This conceptualization is evident in two broad ways: first, as a divide between 'industrialized' versus 'developing' countries articulated in several key Convention documents (discussed below), and second, as a set of principles that undergird notions of acceptable and unacceptable forms of transboundary shipments of hazardous waste under the Convention. Together these facets of the Convention generate a territorialization of its parties that took on greater legal force as the Convention evolved toward ratification in 1992 and the adoption of Annex VII in 1995.

The final report from the first meeting of the Conference of the Parties (COP) in 1992 refers explicitly to 'industrialized' and 'developing' countries as two broad categories of states (Basel Secretariat, 1992). Yet, despite highly specified definitions for issues such as meeting procedures, interorganizational relationships and various financial considerations, no definition of 'industrialized' and 'developing' parties exists in this report. This lack of definition is notable for two reasons. First, it is suggestive of axiomatic assumptions about how the geography of parties to the Convention could be logically divided into two broad territorial classifications ('industrialized' and 'developing' countries) to achieve the regulatory goals of the Convention as it was being discussed by negotiators at the first COP meeting. That it was not deemed necessary to define 'industrialized' or 'developing' parties in these early rounds of negotiations suggests that their meanings were straightforward and shared among those in attendance. The division was, in other words, a condition of possibility for thinking and doing territory (Elden, 2013) that was shared among those in attendance to such an extent that it did not even warrant commentary in the public record of the meeting, even as it was used to conceptually group

states into policy objects (Painter, 2010). As Sidaway (2012) has recently observed, the use of categories such as ‘the developing world’ still proliferates in mainstream media and policy documents, despite their decreasing relevance. Other human geographers have argued that such territorializations are a result of seemingly unconscious and unreflective constructions of the world and the way particular processes operate (e.g., Sidaway & Pryke, 2000; Kaika, 2006). This, we argue, has been particularly prevalent in the development of the Basel Convention, which has transformed an axiomatic construction of the world into legally enforceable regulations. As such, a particular shared conceptualization of territory can be observed taking shape and gaining in performative force through its incorporation into the Convention’s supporting policy documents.

Second, the absence of a definition for ‘industrialized’ or ‘developing’ countries in this report from the first meeting of the COP points to the importance of definitions given to these categories over time in subsequent meeting documents. Documents produced at each subsequent COP meeting increasingly specified which parties fit the ‘industrialized’ versus ‘developing’ distinction. Thus, at the second COP meeting the territorial divide between industrialized and developing countries is defined as the difference between parties that are also members of the Organization for Economic Cooperation and Development (OECD, i.e., ‘industrialized’) and those that are not (non-OECD, i.e., ‘developing’) (Basel Secretariat, 1994a: 19). The division was codified into the Convention as Annex VII, known as the Ban Amendment, which was added to the original Convention text in 1995. Thus, over time the conceptual division of territory accumulates greater performative force, as it moved out of the realm of policy negotiation and became incorporated directly into a legally enforceable document, the Basel Convention itself.

Figure 1 illustrates how the Basel Convention and the Ban Amendment are to work in principle. Transboundary shipments of hazardous waste within the Annex VII group and within the non-Annex VII group are permissible. What is not permitted is transboundary shipment from Annex VII to non-Annex VII parties of anything the Convention defines as hazardous waste in three other parts of the treaty, Annexes III, VIII and IX. This clause may seem relatively straightforward, but a number of ambiguities exist. For example, Annex III provides a list of hazardous characteristics but states ‘the

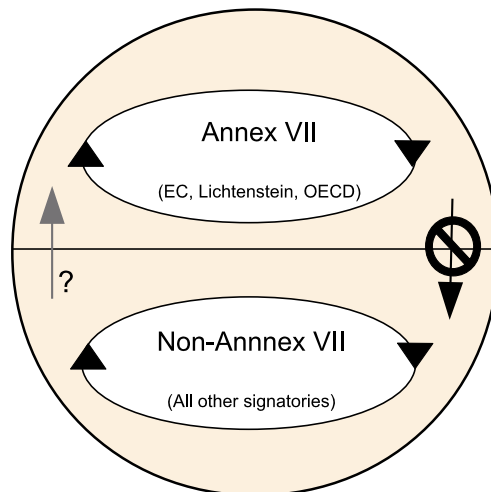


Figure 1. *The operation of the Basel Convention in principle.*

potential hazards posed by certain types of wastes are not yet fully documented; tests to define quantitatively these hazards do not exist' (Basel Secretariat, 2011a: 59). Meanwhile, both Annexes VIII (wastes considered hazardous) and IX (non-wastes) contain materials that pertain to discarded electronics. Thus the calculability of materials as toxicological hazards remains ambiguous, even as the Convention attempts to institute clearly enforceable regulations premised on unambiguous divisions of territory (cf. Wynne, 1989).

The division of parties to the Convention into one or the other of the two groups, Annex VII or non-Annex VII, is further inflected by three explicitly stated principles that further specify their territorialization. These principles—'self-sufficiency', 'proximity' and 'least transboundary movement'—were articulated early on in Basel negotiations and the work of various technical and expert working groups charged with clearly defining and implementing the Convention and its provisions (Basel Technical Working Group, 1992: 11; Basel Secretariat, 2004: 5). The principle of self-sufficiency states that:

countries should ensure that the disposal of the waste generated within their territory is undertaken there by means which are compatible with environmentally sound management, recognizing that economically sound management of some wastes outside of national territories may also be environmentally sound (Basel Secretariat, 1994b: 5).

The principle of proximity states that:

the disposal of hazardous wastes must take place as close as possible to their point of generation, recognizing that economically and environmentally sound management of some wastes will be achieved at specialized facilities located at greater distances from the point of generation (Basel Secretariat, 1994b: 5).

Finally, the principle of least transboundary movement states that such movements 'should be reduced to a minimum consistent with efficient and environmentally sound management' (Basel Secretariat, 1994b: 5).

Each of these principles in the Technical Guidelines presupposes a territorialization that resonates strongly with the work reviewed above on the making of spatially bounded markets for waste and the role of territory in that market-making action. For example, self-sufficiency implies that states should be autarkic when it comes to managing hazardous wastes arising within their national borders. This particular, even peculiar, territorialization of waste takes as axiomatic that it is right and proper for the management of waste arising from the global commodity chains typically connecting producers and consumers *across* borders to be confined *within* the borders of the states in which those 'global' products like electronics are bought and consumed. Thus, in this territorialization evident in the Convention, production may be 'global', but attending to the postconsumption wastes generated from this production is to have a different spatial organization, one ideally confined within national borders. The peculiarity of this territorialization of waste is highlighted if one were to imagine an international trade agreement that required states to be self-sufficient in the production of the commodities consumed by their respective populations. Similarly paradoxical notions of territory are at work in the principle of proximity and least transboundary movement when it comes to managing electronic discards as waste. Typically, electronics are designated as waste generated by household and institutional consumers. Yet, the composition of those products—what they are made of and how they are put together—that will eventually become such waste are given a form and arrangement elsewhere, for example, in design and manufacturing practices that occur in locations that do not necessarily correspond

with the locale of the vast majority of consumers. So conceptualizing waste as generated in the locale of consumption is, again, a particular and contingent territorialization of waste that could be arranged differently.

Moreover, the Convention does not explicitly prohibit the transboundary shipment of hazardous waste from non-Annex VII to Annex VII parties. This lack of explicitness is, perhaps, not surprising given the concerns expressed during the negotiations between 1992 and 1995 over the Ban Amendment about the capacity of developing countries to manage hazardous waste in an environmentally sound manner. What the lack of such language demonstrates, then, is an underlying sense of continuity (Painter, 2010) to the territorialization of the world as it is concretized in the Convention as environmental regulation. In other words, the territorialization of parties fixed in the past under Annex VII continues indefinitely into the future regardless of whether a given party's capacity for environmentally sound management of hazardous waste changes.

Situating Singapore

Singapore is alleged to be a major transshipment hub for waste electronics discarded abroad and brought via Singapore to other countries in the region (Connolly, 2012).

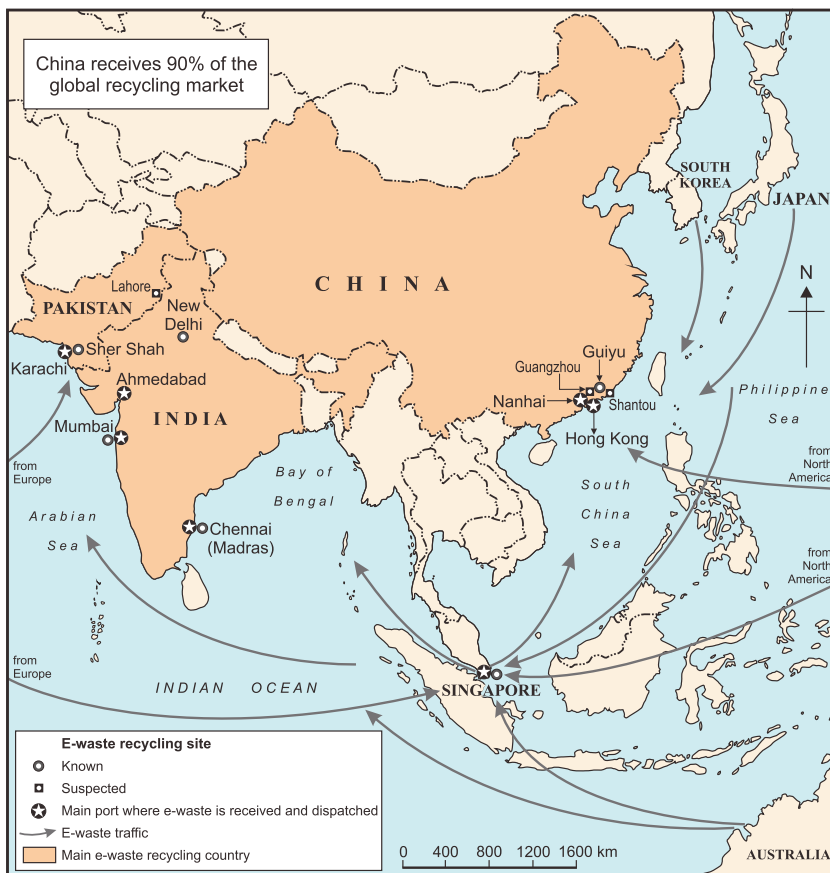


Figure 2. Map depicting Singapore's alleged role in transboundary flows of electronic discards.

Source: Adapted from Schwarzner et al. (2005).

These allegations are typically framed in terms of transboundary movements of ‘e-waste’ that are prohibited under the Basel Convention (Schwarzner *et al.*, 2005; Figure 2). Yet, Singapore’s situation troubles the notion of territory operating in the Convention. The country is in itself a significant source of discarded electronics, rather than merely a transshipment hub, because of its high level of affluence relative to other non-Annex VII parties. For example, ranked in terms of GDP (gross domestic product) per capita, Singapore (USD 55 182) was the ninth wealthiest country in the world in 2013 (World Bank, 2015a). Similarly, it ranked eighth in terms of gross national income per capita in 2013 (World Bank, 2015b) and second by this measure when adjusted for purchasing power parity (USD 78 860) (World Bank, 2015c). Indeed, Singapore’s GDP per capita has exceeded the average of Annex VII’s since 1994 and substantially so since 2000 (Figure 3). Figures such as these demonstrate the difficulty in construing Singapore as a ‘developing country’, as the city-state’s non-Annex VII status would suggest it is.

Singapore’s rapid rise in affluence during the 50 years subsequent to its split with Malaysia is a well-documented story and will not be elaborated on here (e.g., Field & Smith, 1986; Mahizhman, 1999; Olds & Yeung, 2004). Rather, the remainder of this section utilizes empirical research from Singapore in considering how this high level of affluence influences the domestic generation of electronic discards in Singapore and international trade of these materials among other non-Annex VII states. As Adam Ong, a representative of a regional electronics refurbishing and end-of-life treatment company told us, ‘in a per capita sense, [Singapore’s] e-waste output is very high, very very high. Within Asia I think Singapore is actually number one, on a per capita basis. For a small country, it generates a lot of e-waste’ (pers. comm., Singapore, 5 July 2011). This claim is bolstered by recent UN data that estimate the per capita generation of e-waste by Singaporeans at 19.6 kg in 2014, far ahead of its closest neighbours, Malaysia (7.6 kg per capita) and Indonesia (3.0 kg per capita), and ahead of even Japan (17.3 kg per capita) and South Korea (15.9 kg per capita) (UN StEP, 2015). Indeed, the per capita e-waste generation of Singapore ranks it as one of the highest per capita generators of e-waste globally. It is just behind the USA (22.1 kg per capita), Canada (20.4 kg per capita) and on par with much of Europe.

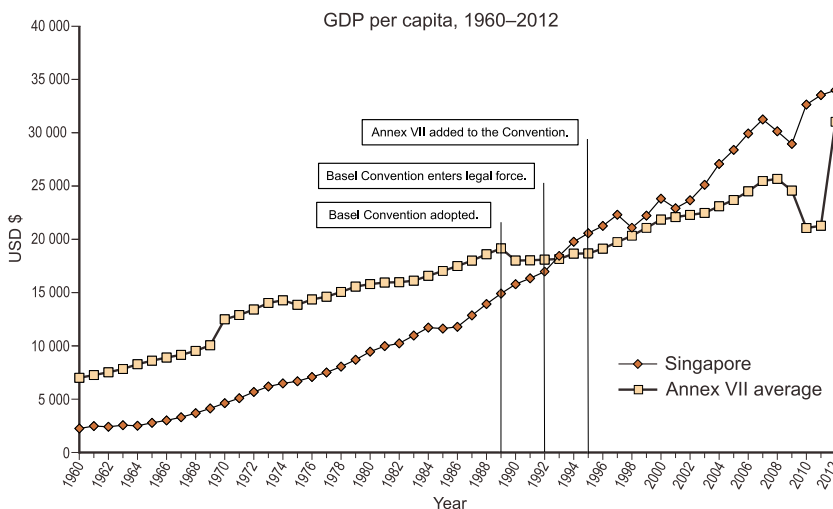


Figure 3. Comparison of Singapore’s GDP per capita with Annex VII average GDP per capita, 1960–2012.

In accounting for Singapore's high per capita e-waste generation, Singh, a Bangladeshi electronics trader in Little India, drew attention to two factors: first, the affluence of its population, which affects the rapid rate of disposal of electronics by Singaporeans who favour and can afford the newest devices; and second, Singapore's substantial base of multinational corporations and corporate headquarters especially in the finance, insurance and real estate (FIRE) sector (pers. comm., Singapore, 1 June 2011). Indeed, with respect to corporate headquarters, Singapore is comparable to second-tier global cities worldwide such as Sydney, Paris and Chicago (Chia & Lim, 2003; Globalization and World Cities Research Network, 2011). The dependence of these firms on sophisticated electronic devices is increasingly high, yet these devices are often only used for a limited time before being discarded, resulting in a considerable amount of high-quality discarded electronics being generated in the country.

Moreover, Justin Ng, a Singapore-based environmental activist and discarded-electronics collector told us that, while there are collection points for electronics around the country, they typically do not receive as much equipment as intended. In Singapore take-back programmes and collection drives are voluntary and occur in a patchwork of dates and locations largely overseen by private firm initiatives (pers. comm., Singapore, 6 June 2011; National Environment Agency, 2013). The low collection rates in Singapore were identified as problematic by Ng, because of the high rates of ownership and use of electronic devices by Singaporeans. Indeed, as of 2013, there were 156 cell phone subscriptions per 100 Singaporeans (World Bank, 2015d), and 85 per cent of the population had personal computers (International Telecommunications Union, 2015). This latter figure puts Singapore among the top 15 countries worldwide in terms of personal computers per



Figure 4. Handbill soliciting 'spoilt' handphones and other electronics posted on wall in Little India. Photograph taken by Josh Lepawsky during preliminary fieldwork, 8 July 2009.



Figure 5. Handbill advertising per kilogram freight rates by air and ship for electronics to India and Bangladesh posted on wall in Little India. Photograph taken by Josh Lepawsky during preliminary fieldwork, 8 July 2009.

household, behind Finland, the UK and United Arab Emirates, but ahead of Canada, Switzerland and Ireland.

Accordingly, our fieldwork revealed a thriving export market from Singapore for domestically generated electronic discards (Figures 4, 5). As Franz Verhagen, a Singapore-based electronics recycling consultant, pointed out, any used electronic equipment that still contain ‘market value’ are typically sold into export markets for reuse via an integrated system of formal and informal used commodity and waste collectors (pers. comm., Singapore, 19 May 2011; cf. Neo, 2010). Many of the local traders based in Singapore use the government electronic business (GeBIZ) website (Government of Singapore, 2015) to purchase the IT assets that they then refurbish and resell, dismantle for components or scrap for raw materials. This electronic database was set up by the Singapore government in June 2000, as part of the e-Government Action Plan (e-GAP I) to improve the efficiency of procurement of electronics in the city-state (Civil Service College, 2010). Most procurement activities by Singapore’s government are conducted through the e-GAP I. Generally, these procurement activities are the responsibility of individual government organizations (e.g., ministries and departments), which independently advertise tenders for sale of their retired electronics under guidelines from the central government’s Ministry of Finance. Singapore-based traders can register with GeBIZ and bid for the government’s IT equipment (Connolly, 2012).

With respect to discarded electronics, traders who export to international markets are mainly concentrated in Singapore’s Little India district. As traders there related to us, the bulk of Singapore’s electronic discards are exported for reuse, refurbishment, repurposing, component recovery and material recycling. Traders we interviewed included both Singaporean nationals and foreigners who either are based in Singapore or travel there frequently from their home countries to glean from Singapore’s large supply of high-quality electronic discards. For example, Dewan, a Bangladeshi trader based in the area, told us his important foreign buyers come from Nigeria, Sri Lanka, India, Bangladesh, Kenya, China, the Philippines, Vietnam, Malaysia and Indonesia (pers. comm., Singapore, 17 June 2011; Connolly, 2012). Usually Dewan exports either full computers or working accessories like printers, as opposed to smaller scrap parts, because of the more limited market (and prices) for scrap items. The electronics traded

from his shop are typically three years old or less, which are determined to have the highest market value. Between 10 and 20 buyers visit Dewan's shop per month. Most of them are return customers who have developed trusted export business relationships with Dewan over the past three years (Connolly, 2012). Dewan's experience underscores two key points. First, export for reuse, not disposal, fetches the highest returns for traders such as Dewan. Second, the typical age range for the equipment Dewan sells is three years or less and, thus, is indicative of rapid turnover rates for digital equipment by Singaporeans—many of whom can afford to discard items in favour of newer models within relatively short use cycles. Thus, to construe Singapore as a source of 'e-waste' exported to other countries for dumping without considering its role as a source of equipment for reuse would be an inaccurate and highly partial narrative.

Foreign traders are attracted to Singapore because of the high quality of electronics discarded there. The quick turnover time for electronic devices in Singapore means that these electronics have a high reuse potential after being discarded (Connolly, 2012). Likewise, cell phones and tablet PCs are only used for one or two years before they are replaced, at which point they are still quite often near state-of-the-art technologies. Another Little India-based trader told us that other countries in Asia, including China and Korea, also export discarded electronics, but the quality is not as good because traders in those locations often take out the valuable components for domestic resale, which is a less common practice in Singapore. Other affluent countries like Canada, the United States and European Union nations also have high-quality discarded electronics, but it is much harder for traders to get visas to go to these locations, and it is increasingly difficult to export from those locales.

What our interviews indicate, then, is the key role that electronics discarded domestically in Singapore play in the international trade of discarded electronics to non-Annex VII countries. As a non-Annex VII party there is nothing in the Basel Convention prohibiting Singapore from exporting domestically sourced discarded electronics to other non-Annex VII parties. At the same time, the Basel Convention also contains a provision (Article 11) that honours any bi- or multilateral trade agreements signed between two or

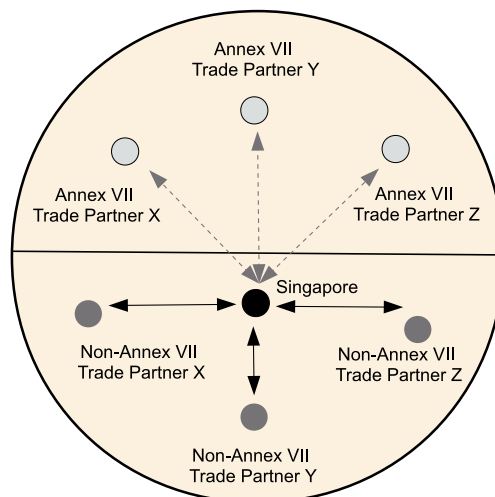


Figure 6. Singapore's role in transboundary flows of electronic discards as a non-Annex VII party. Compare with Figure 1.

more parties to the Convention, so long as those agreements meet or exceed the requirements of environmentally sound management. However, the Convention defines environmentally sound management in such broad terms that it remains open to very wide interpretation. Singapore maintains free-trade agreements with a number of Annex VII parties, including the United States, Switzerland (also a member of the Schengen Area and the EU single market, though not the EU), Japan and South Korea (Government of Singapore, 2012). Meanwhile, Singapore also has trade agreements with each of the Association of Southeast Asian Nations (ASEAN) member states, all of which are less wealthy than Singapore and thus have large domestic markets for its high-quality discarded electronics. Singapore's affluence, together with its designation as a non-Annex VII party and its trade agreements, means that it cracks open the monolithic territorial divisions of the Basel Convention (Figure 6). A net effect is to make Singapore a crucial source of electronic discards for other non-Annex VII parties in ways that are unaccounted for in the regulatory calculations and spatially confined markets for discarded electronics generated by the Convention. The case thus illustrates the regulatory loopholes and peculiar territorial classifications inherent in the Convention, which have strong implications for its continued relevance (see Lepawsky, 2015b).

Conclusion

By way of conclusion, the case of discarded electronics traded from Singapore under the regulation of the Basel Convention enables us to make three points. First, our empirical discussion of the Convention shows that Singapore's territorialization as a non-Annex VII party hinges on the city-state being construed as a 'developing country'. As such, Singapore is understood in the Convention as equally vulnerable as all other non-Annex VII parties to hazardous waste imports from Annex VII parties. Yet, our empirical work shows that the city-state is a key node in the international flows of electronic discards to other non-Annex VII parties via the work of discarded electronics traders in Singapore who facilitate this trade. We suggested that Singapore is able to play this role for several interrelated reasons: first, Singapore's relative and absolute per capita wealth mean Singaporeans are heavy consumers and discarders of electronics; second, the large presence of the FIRE sector in the city-state means high-quality electronic equipment is discarded as a consequence of regular and frequent equipment refreshment at such firms; third, trade between non-Annex VII parties is permitted under the Convention; and fourth, the Convention also permits bi- and multilateral trade agreements to supersede the Convention on the condition that they meet or exceed the Convention's requirements of environmentally sound management of hazardous waste. In these respects, Singapore is a crack in the regulatory facade of the Basel Convention, which attempts to enact a spatially confined market for waste.

Second, we can make some conceptual contributions to the emerging literature on the territorialities of waste (e.g., Gregson *et al.*, 2012; 2013; 2015; Kama, 2015). Our case confirms that it is analytically useful to approach territory as a result of particular and contingent ways of conceptualizing and calculating space. With respect to discarded electronics traded from Singapore under the regulation of the Basel Convention, territory is partially a result of environmental regulation. The conceptualization and calculation of territory in that regulation depends on categorizations of signatories into one of two groups, Annex VII or non-Annex VII territories. Those categorizations are themselves founded on axiomatic understandings of 'industrial' versus 'developing' countries. However, the case also suggests that when analysing the action of territorialization more generally, researchers may find it worthwhile to hold in abeyance any qualifications of territory as a particular 'type' of technology, whether

political (Painter, 2010; Elden, 2013), economic (Berndt, 2013; Gregson *et al.*, 2013; Christophers, 2014b; Kama, 2015) or otherwise. In our case, the Basel Convention attempts to institute a regulatory apparatus for governing the trade of things calculated, ideally via toxicological science, to have hazardous consequences for human bodies and environments. As such, in addition to having political and economic facets, the Convention also relies on the territorialization of signatories to mitigate danger in both a toxicological and moral sense. What this multiplicity of action (e.g., political, economic, toxicological, moral) in the making of territory suggests to us is that such action has no *inherent* qualities of being a political or economic technology per se. If so, we question the analytical value of construing territory as an intrinsic type of technology (e.g., a political technology, cf. Painter (2010) and Elden (2013); an economic technology, cf. Berndt (2013) and Christophers (2014b); or an-always-already-political-economic-socio-technical-arrangement, cf. Gregson *et al.* (2013) and Kama (2015)). We might say it is more analytically useful to approach territory as an 'X-technology', where what constitutes 'X' is, like territory, also a more open-ended result in the case at hand. Such an approach would be suited toward investigating Çalişkan's (2010: 187) assertion that the universe of the market 'cannot be analytically located by imposing boundaries that attach categorically separate logics of economics, scientific, social, or political encounter'. An approach to territory attuned to this assertion would be sensitive to how territory becomes qualified as a particular type of technology (e.g., political or economic).

Third, if it is analytically useful to conceptualize territory as an 'X-technology', then the study of territory would become the study of techniques (i.e., devices and the practices with which they are situated such that they work) without imposing in advance the designation of those techniques as 'political' or 'economic' (or any other designation e.g., 'scientific' or 'cultural'). For by designating in advance territory to be a particular type of technology (political, economic, etc.), we forgo the opportunity to investigate what generates 'the political' or 'the economic' bases of the technology from which territory is said to result. Here, then, is an opening for future studies to put the geographic literature on territory and the territorialization of markets into further productive conversation with the marketization literature (cf. Christophers, 2014a) as well as with recent Actor Network Theory-based approaches to territory (see Conway, 2016). This alternative kind of approach to territory would open up the investigation of it to also include analyses of the qualification of the action from which territory results. The approach would be, in other words, to make the technology of territory a more fully philosophical inquiry into the practices and tools by which territory results.

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