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PORTO

WORKING PAPERS

ECONOMICS

Nº 02/2017

ONE MAN'S TRASH IS ANOTHER MAN'S TREASURE: A COMPARATIVE ANALYSIS OF PROPERTY RIGHTS IN SOLID WASTE

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One man's trash is another man's treasure: A comparative analysis of property rights in solid waste

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This version: November 2017

Abstract

Previous literature has studied waste picking as an economic, social and environmental phenomenon of great importance in countries characterized by ineffective waste collection and recycling programs. The legal foundations of waste picking have, however, received little scholarly attention. Surveys conducted with waste pickers from 5 cities (Bogotá, Pune, Belo Horizonte, Durban, Nakuru) find that existing, and often hostile, regulations and competition from new entrants are key concerns for the waste pickers. In this paper, I argue that any system of legal rules that tries to exclude the waste pickers from the waste value chain results in high transaction costs and risks further aggravating existing social injustices. Several inclusive property right regimes are conceivable, from waste picker ownership of waste to a *res nullius* (nobody's property) regime complemented by a right of first possession. *Res nullius* creates incentives for the stakeholders of waste to specialize in different segments of the collection and recycling chain. Possible drawbacks of this regime are dissipating rents because of open access to waste.

JEL codes: K11, Q53, O17.

Keywords: property rights, solid waste, waste pickers, informal economy, *res nullius*.

[1] I would like to thank Greg Dow and seminar participants in Trento and at the EBEN 2017 Annual Meeting (Jyväskylä) for helpful comments. The usual disclaimer applies.

1. **Introduction**

The modalities of the collection of solid waste and the extent to which recycling takes place are concerns that arise everywhere in the world as a result of economic activities. It is a peculiarity of the large urban centers of the developing (or recently-developed) world, however, that entire households make their living collecting, sorting through and reselling waste materials. I refer to these people as the "waste pickers," in the past known as "scavengers," with many other country-specific terms also encountered in the literature. Many studies have established that waste pickers contribute to the preservation of the environment, through their cleanliness and recycling work. Waste picking is a source of income for some of the poorest members of societies, and hence an ally in poverty reduction. Waste picking is often done by displaced or historically marginalized groups who might be particularly vulnerable to efforts of municipal authorities to limit their access to waste (Altaf & Deshazo, 1996; Birkbeck, 1978; Parizeau, 2015; Sicular, 1991, Medina, 2007).

Because of the informal nature of the waste pickers' work, the legal framework within which their activity takes place seems not to have attracted scholarly scrutiny. This paper hopes to fill this gap. I ask what the property right regime for waste that reconciles efficiency and equity concerns is. I argue that any such regime will be necessarily inclusive of the right of the waste pickers to access waste. The two most interesting models of inclusive ownership are full waste picker ownership of waste, or a *res nullius* (nobody's property) regime, complemented by a right of first possession. The case for an inclusive approach to the property right assignment problem rests on transaction cost considerations, subject to social justice constraints that arise from the histories of marginalization of the waste picker communities of different countries. I argue that waste picker ownership, while equitable and transaction cost minimizing, might be impractical given the lack of formal organization of the waste pickers, even though many membership-based organizations of waste pickers are now active across the Global South. The *res nullius* regime might favor the division of labor and create gains from trade. The waste pickers might specialize in collection and sorting, and the companies in purchasing the materials and re-selling them. The drawbacks of the *res nullius* regime are dissipating rents because of the continuous inflow of new waste pickers.

Considering the proximity of the waste pickers to waste, one might wonder why a case needs to be made to include them in the value chain of this resource. Waste pickers have in practice often found themselves facing strong corporate interests, and a commonly held ideology according to

which private corporations, or perhaps public-private partnerships, are the preferred mode of disposal of waste and recycling, an approach that some have linked to the force of "neoliberalism" (cf. Samson, 2015; Chikarmane, 2014, p. 63). As a result of inimical or nonexistent regulations, the access of waste pickers to waste has been for a long time based either on breaking the law or on custom. This state of affairs is changing thanks to recent legal innovations introduced in some countries. I document the peculiar directions that five countries of the world (Colombia, Brazil, South Africa, Kenya, India) with large waste picker populations have set on in Section 2 of the paper. The purpose is to understand the current degree of involvement of the waste pickers in the waste sectors of these countries. It will also become apparent that in all countries surveyed the waste pickers come from particularly vulnerable sectors of society; that inimical regulations and competition from new entrants are source of concern for the waste pickers.

The case studies confirm Hernando De Soto's insight in *The Mystery of Capital* that property rights are critical to informal sector workers. Legal rights turn inert waste into productive capital that can be pledged. In the case of waste, this transformation is rapid: once waste pickers sort through the garbage and separate the different items, they resell them to intermediaries, or occasionally to companies. Crucial in this regard is safe and continued access to waste. Chua (2017, p. 3074), in a closely related contribution, argues similarly that "careful and clear designation of 'rubbish rights' can contribute to maximising its potential, especially for the marginalized social groups involved in recovering recyclables."

Because the law is a source of concern for the waste pickers, it becomes an urgent policy question to delineate the characteristics of a desirable regulation of the waste sector (Section 3). Scholars of the economic analysis of law have valuable insights to contribute to this debate. In his seminal paper of 1960, Coase laid out the agenda of this type of analysis: "choosing the appropriate social arrangement for dealing with the harmful effects" (p. 18). The harmful effects Coase had in mind were "nuisances," as exemplified by the famous case of the confectioner disturbing the doctor cited by Coase. Waste can generate harmful effects if not handled properly. This brings to the fore the Coasean problem of the "appropriate social arrangement" in the waste sector in light of transaction costs considerations and social justice constraints. I argue that transaction costs, defined as the costs of specifying and protecting property rights (Allen, 1991), are high for the waste sector, given that waste lies on the streets. Social justice means in this paper primarily guaranteeing that the waste pickers continue having access to waste and a decent income. In section

3 I monitor these two dimensions (transaction costs and social justice) for all the possible theoretical allocations of property rights for waste. Final remarks follow.

2. Case studies

In this section I compare five cities with well-studied waste picker populations along five dimensions:

1. Who has *de jure* property rights to waste in these countries?

2. Who has *de facto* property rights to waste?

3. What is the level of legal recognition of the waste pickers and their associations in the waste value chain?

4. Has the level of *de jure* recognition (if any exists) of the waste pickers translated into an inclusive model for waste management?

5. Did the waste pickers explicitly mention lacking positive rights, such as the right to access waste, or negative rights, i.e., the rights not to be harassed by authorities or middlemen? This is relevant information to try to understand the weight of different types of laws (enabling/coercing) in the life of the waste pickers.

Methodology

The primary source of information about the different cities are the five reports prepared by the NGO WIEGO (Women in the Informal Employment: Globalizing and Organizing, www.wiego.org) as part of one of their recent initiatives, the *Informal Economy Monitoring Study* (IEMS), an endeavor that has taken over 10 years to complete in 2016, when a final summary of all studies was published (Dias & Samson, 2016). The authors of the papers in this series have conducted fieldwork with the waste pickers from 5 urban centers: Bogotá (Colombia), Belo Horizonte (Brazil), Nakuru (Kenya), Durban (South Africa) and Pune (India) as well with street and home workers in other cities. These latter types of informal workers are not analyzed here because street and home workers do not depend on a specific material resource that can give rise to property relations. Waste pickers, instead, explicitly rely upon the availability of waste to earn an income.

All IEMS reports summarize survey and focus group answers with a 150-odd sample size and about 75 focus group participants, in each city. The quantitative part of the study focuses on

demographics of the waste picker populations, while the qualitative part on the perceptions of the respondents about policies and the waste value chain dynamics. The variables used for sampling were gender and source of materials. Space considerations make it impossible to present in detail the broader institutional setting in which waste pickers in each city live, i.e., the general level of protection of property rights and the strength of the rule of law. Understanding the local political context is also vital but beyond the scope of this paper[1].

If one takes the Fraser Institute Economic Freedom Ranking (2014) as an index of the strength of property right institutions, Kenya has a score of 7.14 (out of 10), and it is in the second top quartile. South Africa scores 6.64 points (third quartile). India 6.50 (third quartile). Colombia 6.43 (third quartile). Brazil 6.27 (least free quartile). South Africa, India, and Colombia are therefore quite close in this ranking, with Kenya and Brazil doing better and worse, respectively. In 2010 Brazil, Colombia, India, and South Africa were all in the third quartile, Kenya instead again in the second.

While some data on the waste pickers' earnings are available in all reports, we do not attempt any welfare comparison, due to lack of relevance for the study, as well as the difficulties in coming up with total household incomes and perform comparisons among different countries.

All the waste pickers surveyed in the five cities are what Medina (2007, p. 58) called "industrial scavengers," meaning that the materials are recovered to be sold, and the items have no use value to the pickers. This gives the sample a high degree of uniformity. Also, property rights are most meaningful to industrial scavengers (compared to scavengers for, e.g., food) because waste becomes a capital that can be sold, rather than being used as food for humans or cattle.

Regarding the choice of countries, no specific guideline was given in the IEMS documents. Colombia and Brazil are home to two large and old waste-picking communities (Medina, 2007, p. 232[2]) and therefore it is not surprising that they were included in the project. Waste picking has also a very long history in India, and therefore it is not surprising an Indian city was chosen. South Africa and Kenya have not attracted the attention of scholars of waste picking as, e.g., the

[1] As an example, the ideological affiliation of the different municipal administrations of Bogotá had arguably implications for the waste pickers. The current Mayor Enrique Peñalosa (in power since 2016) seems to be less waste picker-friendly compared to his predecessor Gustavo Petro. Another example is that door-to-door collection that succeeded in Pune, one of the cities I discuss, failed in a nearby town (cf. Samson, 2015, p. 21).

[2] Estimates for Brazil, where waste pickers are surveyed as part of national surveys (cf. below) are of about 800,000 people pursuing this activity (http://www1.folha.uol.com.br/seminariosfolha/2017/10/1924742-para-coordenador-de-movimento-lei-tirou-catadores-da-invisibilidade.shtml). The same article reports that there are in the country approximately 1,100 organizations of waste pickers, probably a world record number.

Philippines or Egypt. As we will see, they are both "young" nations concerning waste picking regulations.

Bogota

The waste pickers

The IEMS report for Bogota (Táutiva & Olaya, 2013) reports questionnaire answers for a sample of 152 waste pickers, members of the waste picker association ARB (the Spanish acronym for Bogotá Association of Recyclers). The sample is representative of the estimated 14,000 waste pickers working in Bogota (an upper estimate is 21,000 individuals). About 70% of the gender-balanced sample of respondents stated that they were dependent on informal employment. Less than 10% completed high school. It is estimated that the city of Bogota produces around 6,300 tons of garbage per day and that the waste pickers salvage about 1,500 tons of materials that are diverted from the landfill of Doña Juana, which is nearing capacity.[2]

Asked to rank barriers that they face in their job, the waste pickers cite government policies meant to exclude them from accessing waste as a key concern. Rule uncertainty is also a concern, highlighting that both no rules, as well as poorly-drafted rules, are problematic. Access is of particular concern to the pickers collecting from streets. Those collecting from fixed sources seem to be better off, and in fact, most waste pickers seem to alternate between streets and fixed points. Those working at fixed sources report, however, having to pay "fees" or having to perform in-kind payments to the administrators of the deposits the waste pickers are trying to access. The lack of clear rules about the right of waste pickers to access waste has allowed the rise of position rents. Poorly delineated property rights mean that the pickers face a choice between the insecurity of street work and having to pay fees to access collection points. All waste pickers report also facing increased competition by new waste pickers, often people displaced by the long Colombian civil war that has only recently come to an end; as well as private companies performing collection routes as part of the city's intermittent recycling efforts. The concern with new entrants is a point we return to below, as it is linked to the way in which property rights are delineated. The most fruitful way to understand the waste pickers' concern is, perhaps, as a form of congestion

[2] These are waste pickers' estimates, cf. http://www.elespectador.com/noticias/bogota/situacion-de-los-recicladores-igual-de-hace-30-anos-noh-articulo-671195), reported often in the press (cf. e.g. https://www.newsdeeply.com/womenandgirls/articles/2017/10/16/how-colombias-women-waste-pickers-fought-for-the-right-to-recycle).

externality: eventually, the incumbents fear that there will be too many users of waste for anyone to be able to make a living from this activity.

Other challenges the waste pickers identify are the typical costs of "formalizing" their activity (e.g., obtaining a tax number and insurance against work hazards) as well as other costs of access. The waste pickers report feeling discriminated against because poor, and often report suffering from abuses by the authorities. 98% of respondents report having formal businesses as customers, a sign of the interdependencies between the formal and the informal economy (cf. Danese & Martinez, 2016). A final concern is price drops for the recyclables, a problem for which the waste pickers blame trade and market openness, as well as the economic downturn of the last few years.

The waste pickers perceive as allies the waste picker association ARB (see below), partner organizations, and the Constitutional Court of Colombia, which as we illustrate below has been vital in establishing rights of access for the waste pickers.

The regulatory framework

Waste picking has a long history in Colombia, and this activity has attracted much academic scrutiny (cf. Ruiz-Restrepo & Barnes, 2010; Medina 2007, Chapter 7, and references cited therein). Waste collection and other public services find comprehensive treatment in Law 142 of 1994, heavily amended over the years. This law at Article 15 lists the actors who can provide public services, namely public service companies (art. 15.1)[3]; other physical and legal persons that provide public services (art. 15.2); the municipal authorities, when they take on public service provision directly (art. 15.3); and "authorized organizations" in small towns, rural areas or specific urban areas (art. 15.4). Article 17 dictates specific organizational forms for providers of public services: "public service companies are stock corporations […]." The law makes an exception for those "decentralized entities," local or national, whose owners do not wish to form a stock corporation. These entities can adopt the form of "industrial and commercial enterprise." The law also establishes at art. 40 so-called Exclusive Service Areas contracted out exclusively, and for a given period, to private companies. The decisions regarding contracting out decisions are taken at the city-level.

The waste pickers and their organizations are not mentioned in the law and are therefore excluded from directly providing public services such as sanitation and recycling. This lack of recognition is puzzling because at the time of the enactment of the law the waste pickers were

[3] All the translations from Spanish are the author's unless otherwise stated.

already a familiar presence, especially in Bogotá. In the absence of any legal recognition, let alone of any attribution of rights of access to waste, the access of waste pickers to waste was guaranteed essentially by custom, and by the absence of any national strategy of recycling, which left the recycling business in urban areas to the effort of the waste pickers. The waste pickers of Bogotá formed in 1990 a membership-based organization, the Association of Recyclers of Bogotá (ARB), with the support of a Catholic organization. The ARB has been the leading advocate of the waste pickers' rights in the judiciary of the country, with effects that extend well beyond its membership.

The ARB challenged in court the organizational requirements of law 142, losing the battle in front of the Constitutional Court of Colombia (ruling number C-741 of 2003). Later laws continued to ignore or antagonize the waste pickers. Law 1259 of 2008 established at art. 6 that sorting through garbage after it has been placed for collection is an infraction, subject to sanctions. An earlier Decree (number 1713 of 2002) had established that garbage, once deposited in containers, becomes the property of the municipality, and denied the waste pickers access to sanitary landfills, an early case of denial of access (or "dispossession," cf. Samson, 2015, p. 13)[4]. The ARB challenged Law 1259. The Constitutional Court, in ruling C 793 of 2009, found that while the motivations behind the law might have been praiseworthy (promoting "civic culture"), in practice it affected the waste pickers negatively. The Court declared constitutional the law, with the understanding that it "cannot impede the effective exercise of the activity of the informal waste pickers." This ruling was one of the first establishing the legitimacy of the waste picker's work.

Later rulings of the Constitutional Court (e.g., rulings T-724 of 2003 and T-291 of 2009) established that waste pickers enjoy the status of disadvantaged class, protected by article 13 of the Colombian Constitution, legal victories that some of the participants in the IEMS focus group still remember. In ruling T-724 of 2003, the Court found that the Bogotá public service company (UAESP) did not put in place affirmative actions for the waste pickers in its call for bids. The Court (section 3) asked the city of Bogotá to include the waste pickers in future calls for the management of the city's waste, "due to the fact that the activity that they [the waste pickers]

[4] Such attempts at "dispossession" of waste might be taken as evidence of the efforts of municipal administrations to fully privatize municipal waste management services (cf. the remarks above about the force of "neoliberalism" in the regulation of this sector). Robinson (2016) discusses the history and political economy of Colombian institutions. He points out that fraud in elections, vote buying and clientelism are some of the causes of the "extractive" nature of Colombian political institutions. These peculiarities of the Colombian political process left some classes, according to Robinson, disempowered. The waste pickers might be victims, therefore, of a more general inability of the Colombian democracy, especially in the past, to represent and empower bottom-of-the-pyramid groups of individuals.

pursue is linked to this service, with the aim of achieving real conditions of equality and complying with the social duties of the State."

In a call published in 2010, the UAESP required bidding companies to include waste pickers as shareholders. Again, the ARB challenged the UAESP in front of the Constitutional Court (Auto 268 of 10), alleging that the mandate contained in ruling T-724 of 2003 had not been put in practice in the new call. In Auto 275 of 2011 the Court established that the mere shareholding requirement, be the shareholders the waste pickers or associations such as the ARB, is not an effective way to recognize the role of waste pickers as "waste entrepreneurs", a notion that goes back to another earlier ruling about the rights of waste pickers in Colombia's third largest city, Cali (ruling T-291 of 2009). The economic rights of waste pickers include the right to pursue their activity on a self-employment basis, or through an association, rather than being simply employed by or shareholders of public service companies. The Court reiterated in Auto 275 of 2011 that "the material participation of the waste pickers in the activities of recovery and reuse of waste is fundamental, not only as workers but as entrepreneurs of waste, in which they can employ the knowledge they have acquired during the years and capitalize on the environmental benefits that their activity represents for the city."

In March 2013, the City introduced a payment system to the waste pickers for their collection and recycling efforts. In 2017 this payment was $29 per ton collected of recyclables[5]. Only a minority of waste pickers have been so far eligible to receive this payment, which has encountered difficulties discussed in a December 2016 interview with the ARB's historical leader Nohra Padilla.[3] A recent legislative intervention (Decree 596 of 2016) imposes a mandatory census of the waste picking populations, and the full formalization in a five-year time frame of the waste pickers, within a new general framework for waste collection and recycling that local administrations must develop. According to the press release of the competent Ministry (Housing, Cities, and Territory), the decree has been debated with over 90 organizations of waste pickers over a period of 9 months.[4] The new model proposed by the ministry envisions the separation as

[5] Cf. https://www.newsdeeply.com/womenandgirls/articles/2017/10/16/how-colombias-women-waste-pickers-fought-for-the-right-to-recycle.

[3] Cf. http://www.elespectador.com/noticias/bogota/situacion-de-los-recicladores-igual-de-hace-30-anos-noh-articulo-671195 .

[4] Cf. http://www.minvivienda.gov.co/sala-de-prensa/noticias/2016/abril/por-primera-vez-colombia-expide-normatividad-en-reconocimiento-a-la-labor-de-los-recicladores-dentro-del-servicio-publico-de-aseo-minvivienda.

done by households, the waste pickers collecting at designated points, and receiving payments from the city for collection plus the proceeds from the sale of recyclables.

Belo Horizonte

The waste pickers

The IEMS report for Belo Horizonte (Ogando et al., 2013) reports questionnaire answers for a sample of 149 waste pickers (*catadores* in Brazilian Portuguese, 100 women, and 49 men) — all members of five waste picker associations. About 57% of the sample did not complete primary school. The 66% of the sample depends on informal work for its subsistence. 72% of the respondents were mainly "separators" rather than waste pickers: they did not collect the garbage, but sorted recyclables dropped off by residents or municipal trucks, or deposited by large companies in collection centers. 13% of the participants report collecting materials from the street, an activity that is most likely complemented also by the separation activity. 33% collect waste from business, an activity that is again often complemented by the sorting work.[5] The sample does not include any collector of special or bulky waste (referred to as *carroceiros*), another recognized figure by the applicable municipal law (Municipal Decree 10.293 of 12/8/2000).

Asked to rank hindrances they face on their job, the waste pickers cite their hazardous and unsanitary work conditions. Of particular concern is the poor quality of the warehouses where they work and store the waste. They report that poor storage conditions force them to sell the recyclables immediately, in the fear that the recyclables might deteriorate. Another problem they identify is that the warehouses can be easily broken into. Another concern is relations with the local communities and stigma about the waste pickers. They also were concerned about falling prices, as well as their dependence on middlemen (an "oligopsony" composed of only a few buyers).[6]

The waste pickers perceive as allies their membership-based organizations. They also recognize that the municipality of Belo Horizonte, through its Superintendent for Public Cleanliness (SLU in Portuguese) is a source of recyclables and warehouses, although the quality of these spaces, as already remarked, is a source of concern. They also acknowledge the value of conditional cash transfers from the government to the waste pickers (*Bolsa Família*) or their associations (*Bolsa Reciclagem*).

[5] Sorting and collecting are not mutually exclusive activities, and therefore the figures do not sum up to 100%.
[6] Exploitation by middlemen has been a concern for a long time among Brazilian waste pickers, as already reported by Holmes (1984, cited in Medina, 2007, p. 65).

The regulatory framework

Waste pickers have worked in Belo Horizonte since the 1960s, especially in open-air deposits. When in 1963 a sanitary landfill was built, the waste pickers lost access to waste and started working on the streets (Samson, 2015, p. 5). Samson (2015) and Dias (2011a) trace the origin of waste picker associations back to the late 1980s, when the first association of *catadores*, ASMARE, was created in association with a Catholic organization. The SLU started promoting recycling and inclusion of waste pickers in 1993, and today Belo Horizonte can be considered a leader in the integration of waste picker associations. The Belo Horizonte model is based on the municipal administration collecting waste and bringing the waste to the warehouses for sorting. The city has supported in various ways the associations of waste pickers and provided a framework within which cooperatives of waste pickers can participate in calls for bids for public services and even redistribute public funds to the members (Samson, 2015, p. 6 and ff.). Waste pickers find official recognition in the city's Organic Law and the national law 8052/2000. The legalization of waste picking at the federal level can be traced back to 2001-2002, when a federal law inserted the *catadores* in the Brazilian Classification of Occupations (CBO, cf. also Pérémarty, 2015, and Dias, 2011b).

Article 30 of the Brazilian Constitution (clause V) establishes that municipalities are responsible for waste management services. Law #11.445/07 of 2007 establishes a framework for basic sanitation. It also establishes that waste pickers can receive contracts from the municipality without going through open calls for bids.

Decree 7.405 of 2010 created a "pro-*catador*" program at the national level meant to promote waste picker cooperatives, provide equipment to the waste pickers, create better business opportunities for the pickers and facilitate access to credit for their associations. This intervention aims to remove some of the roadblocks in the life of waste pickers: lack of equipment, limited opportunities to sell the products and limited access to credit. Law 12.305 of August 2010 is the most comprehensive regulation of solid waste at the federal level. It establishes several levels of waste management, from the national level to the municipal one. The involvement of the *catadores* and their associations are mentioned as policy objectives at all levels of care. Article 42 of this law allows public administrations to provide infrastructures and equipment to waste picker associations formed by low-income individuals.

Durban

The waste pickers

The IEMS report for Durban, South Africa's third-largest city (Mkhize et al., 2014) reports questionnaire answers for a roughly gender-balanced sample of 152 waste pickers. About 57% of the sample did not complete primary school. 61% of the sample depended on informal work for their subsistence. 55% of the waste pickers collected from a single point (mostly the Bisasar Road landfill), and the rest were "itinerant."

Asked to rank hindrances they face on their job, the waste pickers cite access to waste as their primary concern. They report facing restrictions in their ability to collect waste from households and to access landfills. The Bisasar Road site was privatized in 1999, and since then waste pickers wishing to work there need to be employed by the concessionary. The enclosure has resulted in less secure access to waste for the waste pickers (p. 12). Other challenges are the low prices paid by the middlemen, and the distance the waste pickers have to cover to get to some buy-back centers. Waste pickers also cite the presence of new competitors, waste pickers and corporate. Another concern is their working conditions and the state of warehouses and storage points. Authorities are cited as a hostile force, mostly fining and asking for bribes, and unwilling to issue official licenses.

The waste pickers of Durban are not organized into associations like those in Belo Horizonte and Bogotá and are deprived of a key ally in their fight for secure access to waste and fair buyback prices.

The regulatory framework

Municipalities are responsible for waste management services under the South African law (cf. Mkhize *et al.*, 2014 p. 9, and references cited therein). This is also the case in Durban, where waste is collected by the company Durban Solid Waste. In a display of lack of consideration for the waste pickers, the National Environmental Management Act of 1998 does not even mention the waste pickers. Past editions of the National Waste Management Strategy (1999) mention the role of "reclaimers," as a phenomenon to be controlled and eventually phased out by 2003. The 2006 amendment to the Minimum Requirements for Disposal of Waste by Landfill makes concessions to "salvagers." However, this legislation requires a layout plan showing where reclaiming will take

place and how health and safety concerns will be addressed. It calls for the registration and issuing of permits to the reclaimers. The reclaimers are expected to elect committees to represent them and are required to sign contracts with the private waste management service providers. Some progress was made in securing access to landfills for waste pickers under the 2009 National Environmental Management Waste Bill, which allows waste management licenses to include "the conditions regarding which salvaging of waste may be undertaken" (article 51i).

Nakuru

The waste pickers

The IEMS report for Nakuru, Kenya (Lubaale & Nyang`oro, 2013), reports questionnaire answers for a sample of 163 waste pickers (86 women and 77 men), all members of a young membership-based organization (Nakuru Waste Pickers' Association, NAWPA). 63% of the waste pickers collect from the only landfill in the area (Gioto), the rest from residential and commercial areas. Over 90% of those surveyed are dependent on informal work for their survival. About half of the sample completed at most primary education.

The respondents identify decreasing and fluctuating prices as a concern. Other challenges are related to the buyers (especially middlemen); extreme hazards for the waste pickers' health and safety, particularly in the landfill, which also receives medical waste; and discrimination. Regarding policy concerns, the respondents cite harassment by city officials.

The regulatory framework

Since 2006 collection relies on companies and local community organizations, which receive contracts from the city. According to the report, a significant fraction of the waste is not collected through this formal channel, hence the role of the waste pickers.

Pune

The waste pickers

The IEMS report for Pune, India (Chikarmane, 2014), reports questionnaire answers for a sample of 150 waste pickers (93 women and 57 men), all members of waste picker union KKPKP (formed in Pune in 1993, cf. Samson, 2015, p. 9) or of a workers' cooperative called SWaCH (active since 2007, cf. Samson, 2015, p. 10), The population of waste workers in Pune is composed

of about 9,000 people. The fixed source waste pickers (all members of the cooperative SWaCH) benefit from a memorandum with the Pune Municipal Corporation that allows them to collect waste door-to-door. Itinerant waste pickers gather material from the streets, dump sites and businesses but not from households. Itinerant waste buyers purchase the materials. The different types of workers have different sources of income: the fixed collectors receive payment from households and revenues from the sale of the materials (cf. also Samson, 2015, p. 10 and references cited therein). The itinerant waste pickers receive only the proceeds from the sale of the recyclables. Buyers purchase materials from the waste pickers and then resell them. The majority of the sample is illiterate and from the Scheduled Caste population (cf. Medina, 2007, Chapter 10, for a historical analysis of the relation between the caste system and waste picking). Virtually all respondents depend on informal work for their survival.

Regarding on-the-job challenges, half of the respondents cite variations in income (lower revenues from the sale of recyclables for the pickers, increasing living costs for all, and increased competition from "scrap dealers" for the waste buyers) and increased competition from migrants and companies as concerns. Access and storage of waste are also concerns for fixed source pickers, who fear to lose access to the households; and for the itinerant pickers, who fear to become unable to access waste because of the city's strategy to remove dumpsters ("skips"). Finally, three-quarters of the respondents report occupational health and safety as a concern.

Local authorities are cited as both an ally and an antagonist. The city provides carts and medical insurance to the waste pickers. Authorities are also cited as engaging in harassment and fining and soliciting bribes. Membership-based organizations are cited as a positive force, providing counsel and different forms of member benefits.

The regulatory framework

Municipal Solid Waste Rules were enacted in the year 2000. They require municipalities to organize the door-to-door waste collection and the segregation of recyclables, which must be diverted away from landfills. This law has translated, according to the author of the report, into outsourcing for private companies and attempts at excluding waste pickers. Pune has been an exception, thanks to the effort of SWaCH that has secured a door-to-door collection contract from the city since 2008. New Solid Waste Management Rules were notified to local authorities on 8th April 2016, but the implementation process is still underway (Bolia & Singh, 2017). The new

Rules require that local authorities set up of materials recovery facilities "to enable informal or authorized waste pickers and waste collectors to separate recyclables from the waste and provide easy access to waste pickers and recyclers for collection of segregated recyclable waste" (article 15 (h)).

The Environment Protection Act of 1986 contains the framework for the collection of waste. It was amended in 2006, and it now also contains an explicit recognition of informal recycling.

Summary

Table 1 summarizes the 5 case studies. The summary report (Dias & Samson 2016) of all the IEMS studies shows that when aggregating all responses, government policies and value chain dynamics are by far the two most significant concerns identified by the waste pickers. Government policies are also identified as a positive force by some of the waste pickers, especially from Belo Horizonte. Access and regulations around it are a concern in all cities, except Belo Horizonte. A concern often cited is also the ability to prevent access to the recyclables once it is in storage centers or other facilities, especially in Durban, Bogota and Belo Horizonte (Dias & Samson, 2016, p. 25). It is clear in fact that sorting to salvage the valuable pieces is the most laborious part of the waste pickers' job. Once the waste has been sorted, it is typically easy to sell the recyclables, although not always at prices regarded as fair by the waste pickers.

Local governments are perceived as the second most important institution/actor, after a composite category called "private business" (Dias & Samson, 2016, p. 34). This is symptomatic that across different realities the main source of regulations for waste, the municipality, is perceived as an important actor. Overall, local governments are considered a hindrance rather than an ally by the majority of the interviewed (Dias & Samson, 2016, p. 35).

The cases offer a broad-enough range of degrees of formal integration of the waste pickers into the solid waste system of the city to build a "ladder" (Dias & Samson, 2016, p. 43). No formal integration of the waste pickers exists in Nakuru, a contention that seems uncontroversial. No formal integration exists, with some degree of tolerance and minimal support, in Durban. Then there are the countries witnessing a transition towards formal integration. Bogotá is in this group but, as Dias and Samson acknowledge, the Colombian capital is fast accelerating towards full integration with a system of fees paid to the waste pickers. According to Samson and Dias, Pune and Belo Horizonte are cases of full formal integration. The meaning of integration is, however,

not precise, as recognized by Dias and Samson (p. 47). Two dimensions were particularly relevant to this category: recognition and formal integration in some parts of the waste value chain.

Table 1: a summary of the 5 case studies.

	Bogota	**Belo Horizonte**	**Nakuru**	**Durban**	**Pune**
***De jure* rights**	Municipality (once deposited in bins)	Municipality	Municipality	Municipality	Waste pickers (for residential waste)
***De facto* rights**	Waste pickers	Municipality	Waste pickers	Waste pickers	Waste pickers
Recognition of waste pickers	High and increasing	High	Low	Low	Low but improving
Inclusive model for waste	Yes	Yes	No	No	Yes
Emphasis on negative or positive rights. If positive, the weight of access.	Positive (right to receive fixed payments)	Positive (right to safer warehouses)	Positive (right to access and to higher prices) and negative (from harassment)	Positive (right to access) and negative (from harassment)	Positive (right to higher prices and safe working conditions)

3. **Property rights assignment problem**

The key legal institution in this paper is property. Waldron (2004, p. 561) defines property as "any system of rules governing people's access to and their use and control of things, whether tangible or intangible, natural and manufactured." Garbage belongs to a class of commodities that for a long time have been regarded plentiful enough not to justify the establishment and enforcement of formal property rights, much like manure in the past (Merrill and Smith, 2010, chapter 3). Barzel (1997, p. 148), notices that economic agents typically have difficulties delineating perfect property rights because "commodities are not uniform and are expensive to measure." Waste seems a fitting example of a highly composite commodity, over which delineation is costly. If people do what they deem "best," Barzel goes on to claim that rights may be said to be always well delineated, a consideration which might, however, be complicated by the historical conditions of marginalization of specific groups, that excludes them from the right to have property rights, what De Soto calls the meta-rights.

Another reason why property rights in solid waste in the past have been poorly defined is that waste is often regarded as a nuisance, a negative value product (Merrill and Smith, 2010, Chapter 3), similar to other forms of waste such as manure. As it happens, these items might come to acquire value thanks to intervening infrastructural or technological improvements, i. e. those that allowed manure to be cheaply transported and resold. Because of our increased ability to recycle, increasing environmental consciousness, and rising commodity prices, solid waste has followed the same path as manure, becoming a prized, composite commodity. This process has been accompanied by an intensification in the attempts to regulate and assign property rights to waste, as documented earlier in the paper.

As a material that can be the source of nuisances, such as bad odors and noxious vapors, garbage is a type of commodity that the original owners tend to prefer as far away as possible. Those who produce garbage assert their right to renounce or abandon their possession, usually in places that have been designated as a waste collection point, to avoid problems of public sanitation related to the casual abandonment of waste (cf. Merrill & Smith, 2010, Chapter 4). In the 'bundle of rights" approach that goes back to Honoré and Coase, the right of abandoning is one of the

"accidents" of ownership[7]. Owners cannot exercise this "incident" in the case of hazardous types of waste, whose disposal is typically regulated.

Being a resource that largely lies on the street or in bins that can be easily accessed, waste seems to be available to anyone who is interested in appropriating it. As already clear from our case studies, *de facto* property rights in waste often lie with the waste pickers. If one defines "transaction costs" as the costs of establishing and maintaining economic, *de facto* (as opposed to merely *de jure*) property rights (as in Allen, 1991, cf. also his recent restatement, Allen, 2017), and economic property rights are defined as "the ability to freely exercise choice" (Allen, 2017, p. 3), then one must conclude that the world of waste is one of *positive* and *high* transaction costs. In this sector, Coasean logic predicts that the interested actors will have incentives to negotiate with each other and exploit gains from trade. By the same Coasean logic the initial assignment of property rights will have an impact on both the distribution of resources and on the attainment of an efficient outcome, justifying an analysis of the distributive effects of different property right regimes.

Considering the presence of many stakeholders in the waste value chain (the households who wish that their garbage is appropriately collected, the waste pickers who depend on waste for their subsistence, the municipal authority concerned with public health aspects of waste, the private companies interested in securing contracts and recyclable materials) there seems to be in general little space for establishing liability rules (cf. Calabresi & Melamed, 1972) or assigning property rights to one category only. Engelen (2002) discusses the benefits of an *inclusive* model of property rights. His two main arguments are directly applicable to our case studies. First, the concept of ownership describes a relationship between the owner and other agents and demarcates relational rights instead of absolute ones. Second, legal rights, such as property rights, always reflect historical conditions and class relations of the society into which they are embedded.

The first regime I analyze is private property. The ancient *Institutes* of Justinian describes four categories of non-private property regimes, that have mostly survived to this day (Perruso, 2002, p. 6): *res publica* (public things that are the property of the state or its administration), *res communes* (common things, property of all men), *res universitatis* (communal things, owned by a community, such as a stadium), and *res nullius* (no one's property, such as wild animals).

[7] Cavé (2015, p. 269) talks about waste as a *res derelicta*, goods that have been owned, but not so anymore, following the intentional act by the former owner to leave the *res* behind through abandonment.

In analyzing these property right regimes for waste, I assess both the transaction costs and the distributive and labor choice effects of each scenario. The different allocations of property rights affect the choice between waste picking on a self-employment basis in the "informal economy," formal employment in a private company that also collects and recycles waste, and other non-waste picking occupations requiring a similar skill-set. For the distributive analysis, it is helpful to distinguish, as customary, between wages, "rents," and profits, and to monitor the appropriators and the levels of each under different property right regime. Rents are payments for the use of a valuable resource, in this case, waste (cf. Alchian, 1991, p. 591). These rents are not monopoly rents, as the waste sector is, rather, atomistic and competitive. The rents arise simply from the "proximity" of the waste pickers to waste, their knowledge of the best spots to monitor and so on. Because of the difficulties of excluding waste pickers from accessing waste, the informal waste pickers earn the value of the full average product of labor, as in the well-known fisheries case (cf., e.g., McCloskey, 1985, pp. 489-490). The ability to appropriate the average product sets informal waste picking apart from other activities such as farming, where laborers earn their marginal product of labor, leaving some rents to be appropriated by the landlord. The average product of labor of the waste pickers includes both a "wage" part, to which we return below, and a "rent" part.

The knowledge that gives rise to the rent can be acquired by new entrants and might, therefore, be temporary only, as in the case of quasi-rents. The average product of labor is likely to fall in the long run under the weight of new entrants, reducing waste pickers' income. This process might be already underway in the cities surveyed in Section 2. The waste pickers often report, in fact, a concern with new entrants. The rent dissipation that occurs in the waste sector under the weight of open access leads us away from the full equalization of the marginal product of labor across industries. Instead, the average product of waste picking will be equal to the marginal product of all other industries, creating a welfare loss and a misallocation of labor.

Claiming that waste is a source of rents implies defining it as a "good," something valuable for the waste pickers and other stakeholders, which suffers from open access issues. Chua (2017, p. 3074) argued that "'good quality' recyclable rubbish can be viewed as a limited resource", as most of the materials disposed of as waste might be of little (or even negative) value. We will not discuss further the fact that the producers of waste typically view waste as a "bad," or perhaps an *anticommons*, i.e., a good which society has a joint interest to underproduce (Heller, 1998).

Entry into the waste picking sectors cannot be entirely prevented, and some rent will be dissipated under all property right regimes. If the entry prices into waste picking are all clustered around some "most common entry price," the supply curve of recyclables will be flat (cf. McCloskey, 1985, p. 294). This means that small price increases will result in large increases of quantity supplied, possibly decreasing the average product. Some property right systems can, however, attenuate the rent dissipation problem by trying to regulate access. These allocations of property rights are instrumental to the reduction of poverty in this sector and the rectification of historical injustices against the current waste pickers.

Wages and profits are also forms of "rents," i.e., payments for the use of the resource (labor and "capital"). Wages are payments for the labor time spent collecting and sorting through waste. These could take the form of payments to the waste pickers from the households (as in Pune) or the firms producing waste, transfers from the municipal administration (as in Bogotá), redistribution of resources within cooperatives of *catadores* (as in Belo Horizonte), or wages to the waste pickers if they become formally employed by companies. Profits arise in the case in which private companies start operating in the waste sector, which is the case in all cities surveyed in Section 2.

I concentrate here on different property right allocations for solid waste that lies *on the street*. A policy choice has been made in many countries, such as Colombia, not to allow waste pickers into landfills, due to the hazardous nature of such places.

Private assignment of property

In a private assignment of property "rules or property are organized around the idea that contested resources are to be regarded as separate objects each assigned to the decisional authority of some particular individual" (Waldron, 2004, p. 562). The key word in Waldron's definition is "particular," a typical symptom of the "exclusive" nature of this assignment of property rights. There are two candidate owners for waste: the waste pickers or private companies.

Waste pickers, or their associations, are likely to lack the infrastructure, equipment, and know-how to take on full responsibility for waste collection and recycling.[6] Waste pickers could lobby the local administrations for equipment and spaces, as in Belo Horizonte, but this is likely to be a

[6] In Colombia, as we have seen, the law mandates a corporate form for contractors of waste services, making waste picker ownership impossible.

long-term objective, not a solution to the problem of who should collect and recycle today. If granted ownership rights for waste, the waste pickers could also alienate these rights to other actors, such as private companies. The companies would, in this case, be employed by the waste pickers. This is a possibility, even though in none of the countries analyzed such types of relationships arise. Partnerships between the waste pickers and formal companies have arisen, instead, in several countries (cf. Danese & Martinez, 2016, for an example).

The second solution is private companies' ownership. These companies could hire[7] then the waste pickers. Any attempt to exclude the waste pickers altogether would clash with the fact that the waste pickers have easy access to waste, unless corporations are willing to make a significant investment in waste picker-safe bins[8]. The waste pickers who are not employed by the private companies would still have access to waste, but one can conjecture that if enough waste pickers become formally employed, then the value of the remaining waste would fall to the point where other pickers would not want to enter the industry as self-employed. In this scenario waste pickers do not appropriate any of the rents of waste, receiving instead only fixed wages. The waste pickers would not be exposed to price fluctuations of commodities, an often-mentioned concerned in the IEMS reports. Waste picker associations such as the ARB could function as unions, helping the waste pickers getting rents indirectly through collective bargaining. The companies, provided they can regulate access, would appropriate any resulting rent.

Public assignment of property (res publica)

Here it is the public authority, central or decentralized, that owns waste. The public authority might then grant a concession to manage particular segments of the waste value chain to private companies or the waste pickers. This situation is not far from the status quo in many of the cities we surveyed (e.g., Colombia, where waste becomes the city's property once deposited in bins).

The case for garbage to remain public can be made on several grounds. Transaction cost considerations might prolong the permanence of waste, in some regions of the world, in the public domain, which in practice means that the commodity becomes *res nullius* (nobody's property, cf.

[7] As we have seen in Section 2, the Constitutional Court of Colombia in Auto 275 of 2011 has explicitly considered this possibility, and it has concluded that it is incompatible with the "entrepreneurial" nature of the waste pickers' job.

[8] The current (2017) Mayor of Bogotá Enrique Peñalosa has stirred controversy for his attempts to invest in large bins that would make it difficult for waste pickers to sort through garbage. Cf. http://www.contagioradio.com/alcalde-penalosa-es-irresponsable-y-no-respeta-a-la-corte-constitucional-recicladores-articulo-47846/.

below). In the case of water, Saxer, (2010) has suggested that the State might hold the property rights in water "in trust" and grant access and use to citizens, to safeguard the rights of all to access this crucial resource. However, waste is not equally essential to human livelihood, and therefore the analogy with water has its limitations.

The property of waste might be left in the public domain because of social concerns related to waste being part of one's livelihood and personhood (Radin, 1982). The lives of waste pickers critically depend on the availability of waste.

Public ownership implies free entry into the waste picking sector. This state of affairs has two drawbacks. The first is the indeterminacy as to who should and will take care of waste collection and recycling. Second, public ownership will result in rent dissipation, perpetuating the conditions of poverty of waste pickers. I return to this point below in the analysis of the *res nullius* regime.

Common (res communes) and communal (res universitatis) assignment of property

Two forms of ownership that are similar to public ownership are common property, where resources are in general use and communal (or collective, the term used by Waldron, 2004, p. 562) property, where the community collectively determines how resources should be used. Cavé (2015) describes urban waste, once deposited, as a common pool resource, a category introduced by Ostrom (1990, pp. 287-288) to describe resources, such as pastures or water sources, which the community has a joint interest in overusing and for which regulating access might be particularly hard or impossible. If this an accurate description of waste, "common" ownership will result in rent dissipation, as in the classic example of the fisheries.

Some attempts at a "communal" ownership of waste have appeared in the form of waste picker associations that grant a membership card, such as the ARB in Bogotá. Cooperatives have governance costs (cf. ILO and WIEGO, 2017), which explains the often-low membership rates in these organizations (García, 2011). In a communal ownership of waste, the association of waste pickers would also need to decide the rate of return on the waste pickers' time, as well as how to distribute the rents. These governance costs are peculiar to this assignment of property rights and need to be included in a comparative analysis of the costs and benefits of different allocations of property rights.

There is growing evidence that the law might play a key role in promoting membership-organizations and overcoming the unwillingness of some waste pickers to join these organizations.

Chua (2017) studies institutional and regulatory changes in the waste picking sector in the Philippines and the impact of those changes on the life of the waste pickers working at the Payatas open dump in Metro Manila. Before a deadly accident in July 2000, Payatas was an open access area. After the accident, the creation of membership-based organizations was mandated by law, and security personnel at the dump ensured that only the members of these organizations could access the dump. Chua argues that "the designation of groups and specification of picking time and location have, to an extent, helped improve the situation of around 2000 poor scavengers" (p. 3081). The Supreme Court of Colombia has stressed in several instances that the promotion of organizations of waste pickers is an effective way to involve the waste pickers in the waste sector (cf. e.g., Auto 268 of 2010). These organizations also act as advocates of the interests of the waste pickers. Colombia is, again, a leading example of a country where innovations in the regulations of waste were obtained thanks to the work of associations such as the ARB.

Nobody's property (res nullius)

This property regime can be found already in Roman law and was used later by Hugo Grotius in his discussion of maritime law in *Mare Liberum,* a legal brief published in 1609 to justify Dutch expeditions in seas claimed by the former Spanish motherland (cf. Perruso, 2002). Grotius quotes at length Latin jurisconsults in *Mare Liberum,* claiming that all lands were initially unoccupied and therefore belonged to no one (Perruso, 2002, p. 90). Assets were then progressively "privatized" in a process that Grotius, like earlier Roman writers, calls *occupatio,* or possession. In the case of objects, possession takes the form of seizure. In the case of immovable things possession takes the form of boundary tracing, or of construction on the property (p. 91), which is what we observed in the Americas and Australia after the arrival of the European settlers. Grotius noted that *occupatio* is not possible for the seas, neither by seizure nor by boundary building, and therefore the seas need to remain *res nullius*, accessible to all (except pirates). According to Grotius nations could only forbid access up to three miles from the coast (the distance that could be covered by cannons, at the time). The *res nullius* regime found application in the regulation of access to manure, a form of waste on its own. In the case *Haslem v. Lockwood (*37 Conn. 500 1871) it was established that the person who gathers it is the owner and hence legitimized to sell it.

In a *res nullius* assignment of rights in waste, waste belongs to the first person who first lays claim to it, also referred to as the "rule of first possession" (cf. Lueck, 1995). This is a regime that

favors competition among different actors and encourages specialization. Those that are likely to have the readiest access to waste, the waste pickers, are likely to concentrate on picking and sorting, collecting fees from the producers of waste or the municipality. Companies and middlemen might instead specialize in recycling and commercializing the recyclables. The *res nullius* regime is an exemplification of Engelen's inclusive approach to property, as nobody would enjoy exclusive access to waste.

This allocation of property rights also has some drawbacks. Different categories such as the waste pickers and the companies, and different actors within these categories, might try to exclude others from accessing waste, given that legally no one can attempt to establish legal rights to the entire resource. This could result, for example, in a close monitoring of collection points and frequent collection of waste—not necessarily negative aspects. These efforts at excluding others are costs that must be taken into account when comparing the different regimes. In general, it is costly both to establish and maintain property rights and to maintain a situation in which no property claim can be made to a resource, as in a *res nullius* regime.

The *res nullius* regime is likely to favor free access to waste picking, an activity requiring a relatively small investment in physical capital (e.g., purchasing a pull-cart). As already mentioned, the free entry would depress the value of the average product to the point of indifference between waste picking and work in other activities. This regime implies full dissipation of the rents in the waste sector, as each waste picker pursues a marginal revenue product of labor that is less than the average revenue product, increasing the total value product, but decreasing the average.

In a *res nullius* regime, the pickers who are already in the industry have incentives to organize themselves in ways meant to defend their income levels and try to deny access to newcomers. Some form of access regulation to waste is, therefore, desirable from an efficiency and social justice point of view even in a *res nullius* regime. Creating barriers to entry allows those currently picking to capture some of the rents, relative to the agents who are diverted towards other occupations. Waste picker associations might play a vital role in regulating access within this framework of property rights (cf. also ILO and WIEGO, 2017), even though defending "incumbents" against "new entrants" might be seen as a betrayal of these associations' commitment to solidarity and non-discrimination.

Table 2 summarizes the pros and cons of the different initial allocations of property rights.

The choice of a property right regime for waste

The theory of Demsetz (1967) predicts that property rights over waste should be established if the benefits related to the establishment of these rights exceed the costs of establishing and maintaining property rights, which is the way we earlier defined transaction costs. Nowadays delineation of property relations in waste has happened or is underway in many countries, a phenomenon which, given the high transaction costs, must be attributed to increasing benefits from delineation.

Assuming one could allocate property rights starting from a situation of legal void, Coasean logic dictates that the choice should be made based on the lowest associated costs of establishing and enforcing property rights. In the approach that goes back to Barzel (1982) and Allen (1991) transaction costs depend on two key variables: the costliness of information related to the goods at the center of the exchange, and the human-led alterability and naturally occurring variability of goods. Information about the quality of waste is costly, as it requires careful sorting and inspecting by people who pursue this activity as professionals. The inclusion of waste pickers will, therefore, be a feature of any transaction cost economising allocation of property rights. Next to transaction cost concerns, there are the social justice concerns, as the waste pickers are groups of marginalized and historically discriminated people. Social justice concerns also require a form of waste picker involvement. The involvement might take the form, as we have seen, of private employment by public service companies, or of more creative, hybrid arrangements in which the waste pickers and their organizations interact with municipal administrations and private companies. The choice between these different, inclusive regimes ultimately depends on local specificities and the constraints imposed by the existing regulation of public services.

Table 2: initial allocation of property rights for waste

Exclusive or Inclusive model	***Regime***	***Who owns de jure?***	***Transaction costs***	***Fairness w.r.t. the waste pickers***	***Summary***
Exclusive	Private	Waste pickers	Low	Yes	Unfeasible
Exclusive	Private	Companies	High	No	Socially unjust
Exclusive (Engelen)	*Res Publica*	State/Municipality	Low	Possibly no, due to rent dissipation concerns	Outcome unpredictable and rent dissipation
Inclusive	*Res communes*	All	Low	Possibly no, due to rent dissipation concerns	Outcome unpredictable and rent dissipation
Inclusive	*Res universitatis*	Community	Low	Yes, but governance is an extra cost specific to this regime.	Governance issues
Inclusive	*Res nullius + Haslem right*	First accessor	Low	Yes, but concerns related to rent dissipation	Promising, but open access leads to rent dissipation

Conclusion

The purpose of this paper is to discuss property rights in waste, both from the point of view of the way the law *is* and from the normative point of view of how the law *should be.* The local solutions I have presented in Section 2 are often mixes of the archetypes discussed in Section 3, mixing elements of communal, public, private, and *res nullius* ownership. This paper has argued that, based on transaction costs and social justice considerations, any allocation of property rights in waste needs to be inclusive of the interests and demands of the waste pickers, in particular safeguarding the right of waste pickers to access waste.

I have argued that some of the countries surveyed are moving towards an inclusive model. This is encouraging, and it demonstrates that efficiency and distributive concerns can be addressed together through an inclusive model for the ownership of contested, and potentially harmful, resources.

The inclusive approach to property rights defended here is an alternative to traditional stakeholder involvement arrangements used by companies, as part of their corporate social responsibility (CSR) strategy (cf. e.g., Clarkson, 1995). Many waste pickers are reluctant to become mere employees of public service corporations. Also, the legislation of some countries (e.g., Colombia) emphasizes the notion of "waste entrepreneurs." Bottom-of-the-Pyramid entrepreneurship of the kind pursued by the waste pickers typically requires more creative solutions than simple "privatization,", if one adopts social justice and efficiency as policy objectives. The reasons why some waste pickers might envision themselves as "entrepreneurs," such as in Colombia, while in other cases they seem themselves as employees of membership-based organizations (e.g., in Brazil, cf. ILO and WIEGO, 2017, pp. 26-26) might be due to institutional conditions, the history of relationships between the city and the pickers (adversarial for a long time in Bogotá, somewhat more collaborative in Belo Horizonte), or to identity-related concerns.

Among the limitations of the study, one is its exclusive focus on "industrial scavengers," i.e., those who salvage with the objective of reselling the materials. Property rights, and rights to access, are no doubt meaningful also for those who scavenge for food for household or cattle consumption. This category of people has not received the same degree of attention in the literature as industrial scavengers.

Galiani et al. (2017) show that in Colombia informal sector dealing and formal sector dealing are two alternative ways to conduct the same businesses, each with its associated costs and benefits. Incentives introduced is 2010 to "allure" informal businesses into the formal economy were not enough to retain businesses in the formal sector when these businesses had to start to pay taxes, even at favorable rates. It would be interesting to investigate empirically how the allocation of property rights in waste across *different* countries influences the choice between formal employment in the waste sector and self-employment as an informal waste picker.

It has been earlier remarked that different property right regimes distribute the rent differently or influence the aggregate size of the rent. In some scenarios, the pickers get no share of the rent, either because it accrues to someone else (local government, a private company, etc.), or because free entry drives the rents to zero. In other cases, the pickers will get a share of the rent if they are part of an institution, such as a membership-based organization, that prevents entry by non-members into the waste picking sector, the case of the Payatas dump studied by Chua (2017). It is left for future studies to discuss how to effectively balance the interests of those currently devoting their efforts to waste picking and the interests of the potential new entrants.

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