



# Dispossession by platformization: The rise of on-demand recycling in urban India

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## ABSTRACT

Over the past decade, urban India has seen the emergence and proliferation of startups that are offering on-demand recycling services using web- and mobile-based platforms. These firms replicate the services of informal workers known as kabadiwalas who have historically made their livelihoods through trade in recyclable materials. Existing analyses of platformization in developed world contexts fail to explain the rise of platformization in India because of the particularity of the relationship between platform firms and the informal economy. This paper contextualizes the rise of platform recycling startups within a generally conducive policy environment focused on improving sanitation, encouraging entrepreneurship, and expanding the use of information technology in India. An examination of business models deployed by these firms reveals how and why the structure of recycling markets does not allow for a 'lean' model typically adopted by platform firms in other sectors. Rather than merely connecting service providers to consumers, these startups rely on aggregating recyclable materials and dispossessing intermediaries such as kabadiwalas in order to generate surplus value in an otherwise saturated market. Relying on an analysis of online content about these new firms, this paper examines the strategies that firms use to legitimize themselves and delegitimize kabadiwalas in an attempt to displace and dispossess them from the market space.

## 1. Introduction

Startup firms offering on-demand recycling services have proliferated in urban India over the past decade. Firms offer recyclables collection services using online platforms such as websites and mobile applications through which waste generators can request and schedule pickup of recyclables. These firms are replicating services that have historically been provided by kabadiwalas, self-employed workers who buy recyclables from households and businesses in their informally negotiated urban territories, and sell those onwards to larger recyclables traders. This paper investigates the effects of this recent surge in recycling start-ups, the nature of these businesses, and the significance of their presence in contemporary urban recycling markets in India.

Much scholarly attention has been paid to wastepickers, one set of workers in urban informal recycling economies around the world, who make a living by extracting recyclables from the waste stream at various points in waste's urban journey from the point of production, such as a household, to its final resting place such as a landfill (Dias, 2016). In the Indian context, for instance, much has been written about displacement

and dispossession of wastepickers as a result of the changing landscape of municipal waste service provision, and the organization of workers in response to these changes (Chaturvedi and Gidwani, 2010; Chikarmane, 2016; Demaria and Schindler, 2016; Wittmer, 2022). By contrast, less attention has been paid to kabadiwalas, who differ from wastepickers not only in the nature of their work but also in their socio-economic positions (for exceptions, see Doron and Jeffrey, 2018; Gill, 2009; Hayami et al., 2006). In general, the distinction between the two could be thought of as a distinction between kabadiwalas as those who *purchase* high-value recyclables versus wastepickers as those who *extract* low-value recyclables from waste (Luthra, 2021). And these distinctions follow dominant social stratifications intersecting class, caste and gender: kabadiwalas tend to be from relatively higher socio-economic positions compared to wastepickers who are typically poorer, lower caste, and more often are women (Gill, 2009; Hayami et al., 2006).

Much like the two groups have garnered different degrees of scholarly attention, they have also been treated differently in policy. The difference in the nature of their work and their socio-economic positions can partly explain the difference in policy attention. While wastepickers

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extract low-value recyclables from municipal solid waste that falls squarely within the ambit of municipal responsibility, the high-value materials kabadiwalas trade in, are a part of a parallel market that does not ever enter the municipal waste stream, and therefore has been largely outside the domain of municipal regulation. For instance, while the national rules governing the management of municipal solid waste in India (*Solid Waste Rules 2016*) stipulate municipal responsibility for waste management service provision, markets in high-value recyclables are largely unregulated. Consequently, while wastepicker organizations have been able to lobby for changes in regulations to protect their livelihoods, kabadiwala livelihoods are subject to the vagaries of an open market. Until now, this lack of market regulation hasn't posed a problem for kabadiwalas so they haven't needed to organize to protect their market share. However, on-demand recycling firms are emerging as formidable competitors against traditional kabadiwalas in the high-value recyclables market. Drawing on an analysis of how on-demand recycling startups attempt to carve out a space for themselves in the urban recycling market landscape, this paper explores the potential consequences of their emergence on the existing informal recycling economy.

In what follows, we first contextualize this phenomenon within the existing scholarly literature in geography and allied disciplines. Following a brief description of the methods, we situate the rise of these firms within an enabling policy and economic environment. Next, we examine how startup firms frame themselves in contrast to the work and workers in the existing informal recycling economy. The final section predicts and analyzes the potential outcomes of the rise of startups on kabadiwalas. We conclude by considering the limitations of our methods and recommending policies to protect the livelihoods of kabadiwalas in this fast-changing landscape of recycling service provision in urban India.

## 2. Platformization and the informal recycling economy

The informal economy of waste and recycling consists of a complex network of actors who valorize urban discards. Conceptualized as a hierarchical pyramid, this network comprises of wastepickers (those who extract low-value recyclable materials from waste) and kabadiwalas (those who buy high-value recyclables) at the bottom, and reprocessors (those who transform recyclables into new commodities) at the top, with several levels of intermediaries in the middle (Agarwal et al., 2005; Chaturvedi and Gidwani, 2010). Although the term kabadiwala (also sometimes referred to as raddiwala referring to collectors of raddi or used paper, and pheriwala referring to the itinerant nature of their work) is used to denote a range of actors in the informal recycling economy including small and large scrap trading intermediaries, in this paper, we use the term to refer specifically to those who purchase recyclables directly from waste generators such as households. Often using bicycles and rickshaws, kabadiwalas travel through urban neighborhoods, announcing themselves using distinctive calls to alert potential clients of their presence (Doron and Jeffrey, 2018; Gill, 2009; Hayami et al., 2006). If a sufficient quantity of recyclables has accumulated in a home, householder women or their domestic servants respond to the call of the kabadiwala to whom the materials are sold typically after perfunctory arguments over their prices and weights (Luthra, 2021). In addition to high-value recyclables such as paper, cardboard, metals, glass and plastics, kabadiwalas also purchase larger items such as furniture and appliances. Many of these larger items find second lives once repaired and refurbished. Although their work is not regulated directly by local governments, some have permits issued to them by neighborhood associations in the localities where they purchase recyclables from residents and many bribe the local police in order to conduct their daily business (Chintan, 2003; Gill, 2010). New platform recycling startups emulate the kabadiwala business model offering clients the additional convenience of scheduling pick-ups rather than waiting for the kabadiwala's call in the neighborhood.

Kabadiwalas could be thought of as 'subsistence entrepreneurs' (Viswanathan et al., 2014), operating within the 'need economy' (Sanyal, 2007), occupying the space of 'non-corporate' capital (Chatterjee, 2008). By contrast platform firms represent corporate capital within an 'accumulation economy' (Chatterjee, 2008; Sanyal, 2007). Drawing on ethnographic fieldwork in scrap markets in Hyderabad, Gidwani and Maringanti (2016: 122) contest such dualistic representations, and instead call our attention to a "porous continuum that is sectorally heterogeneous, and that workers ... differentially traverse over the course of their working lives." Much like mobility platforms such as Uber, recycling platforms are also spatially embedded, and therefore must articulate with localized configurations of existing economic activity (Stehlin et al., 2020). The labor of workers such as kabadiwalas in the informal recycling economy has been described as infrastructural labor, part of the an urban "infra-economy" that is "vital to the production of urban space such that it is conducive to capital accumulation" yet remains unrecognized (Gidwani and Maringanti 2016: 113). Scholars of platform urbanism have alerted us to the deepening of geospatial dimensions of the platform economy, particularly the reconfiguration of urban space through the articulation of platforms with existing infrastructural scales (Stehlin et al., 2020). In a market that is saturated in the sense that most or all sellers already have buyers, platform firms' articulation with, and attempts to disrupt, reorganize and rescale existing recycling markets, and the consequences of these reconfigurations for kabadiwalas, are poorly understood.

Critical scholarship on platform capitalism in India situates it as an extension of long-term politico-economic strategies of modernization and development construed primarily in technocratic terms where the state is a "key interest in incubating the platform economy" (Athique and Parthasarathi, 2020: 2). While such an ethos reflects dominant international trends, these scholars suggest that existing analyses of platform business models in developed world contexts (e.g. Srnicek 2017) are not able to fully explain why different types of platform firms proliferate in developing countries such as India (Rai, 2020; Surie and Koduganti, 2016). In contrast to the so-called 'sharing economy' paradigm in developed countries such as the U.S. which mobilizes private spare capacity (labor and resources), platform startups in developing countries such as India aim to disrupt and capture informal economic activity (Athique and Parthasarathi, 2020). For instance, Uber's business model in developed countries such as the US depends on people who have spare time and a car. By contrast, a platform firm such as Urban Company in India relies on capturing the economic activity of existing informal service providers such as barbers, beauticians and house cleaners. While platformization of informal economies has been examined in a range of sites and sectors, the rise of platform startups in the recycling sector, and its consequences on the existing informal economy, thus far remains largely unexamined, barring a brief critical discussion by Gidwani and Corwin (2017) and a few scattered celebratory accounts of their emergence (Ahmed et al., 2022; Bhadra and Mishra, 2021). Further, while scholars have paid attention to how platform firms have both enabled and benefitted from a conducive policy environment (Athique and Parthasarathi, 2020; Attoh et al., 2019; Davies et al., 2022; Kaye-Essien, 2020), the specific policy context within which on-demand recycling firms have emerged in India, is less well understood.

Platform firms in India capture informal activity by converting previously informal workers into legible gig-workers who not only offer new kinds of convenience but are also more palatable to a "security-crazed" urban consumer (Rai, 2020: 310; Athique, 2020; Athique and Parthasarathi, 2020). Tactics of legibility include bringing informal workers into the ambit of transactional record, the professionalization of work and workers through training in customer service protocols, and the imposition of surveillance through processes of vetting and verification (Athique, 2020; Raval and Pal, 2019; Ticona and Mateescu, 2018; Surie, 2020). These tactics however need to be read within longer histories of attempts to control urban informality as part of recurring

world-city remaking projects, processes that have been described as disciplinary technologies of formalization (Luthra and Monteith, 2021). If platformization is associated with a trend of increasing informalization in the Global North, then often the very same platforms are said to increase formalization in the Global South, albeit not in terms of transforming the labor-capital relation into a standard employment relationship but by standardizing work and work processes (Stehlin et al., 2020; Ticona and Mateescu, 2018). In doing so however, service standardization through platformization displaces the “situated knowledge and networks that informally employed service workers use” (Surie, 2020: 96). This paper explores how these processes play out in the context of the informal recycling economy in urban India.

Some scholars have urged that platform firms, as “accelerants of precarity,” be seen as a continuation of longer-term structural trends of labor flexibilization, and thus provide a way for those firms to achieve accumulation by dispossession (Vallas and Schor, 2020: 280). The emergence of recycling startups can thus be conceptualized as part of a longer history of the structural devaluation of informal waste work through processes of privatization, mechanization, and an enclosure of the urban commons of waste (Gidwani, 2013; Gidwani and Corwin, 2017; Samson, 2015). To the extent that platformization is associated with a certain (limited) kind of formalization of previously informal workers in the Global South, then, as some scholars have argued, we need to critically attend to the processes of “dispossession by formalization,” that is the ways in which formalization can increase exploitation, engender new class cleavages among workers, destabilize existing forms of recognition, and reduce their collective power (Tucker, 2017: 90; Anantharaman, 2019; Millar, 2018; O’Hare, 2020; Tucker and Anantharaman, 2020). An examination of the specific ways through which platform firms attempt to extract surplus value through interlinked processes of formalization and dispossession, can inform the identification of political strategies that aid in building alternative urban futures.

### 3. Methods

This research relies on a content analysis of Indian platform recycling firms’ web presence (websites, social media sites, and news reports), conducted between May and October 2022. An initial set of google searches and searches on Android and iOS application platforms yielded about 50 firms that advertised recycling services in various Indian cities. Upon more in-depth research, we delineated three criteria for selecting firms for detailed analysis. First, the firms should provide on-demand recycling services using a platform (websites and/or mobile applications). Firms that had websites that did not offer on-demand recycling services and only provided information for potential customers were excluded from the analysis. If a firm’s website allowed potential customers to schedule a service, then it was included in the analysis. Second, the firms should deal in all kinds of recyclables rather than only specific materials such as e-waste and/or plastic waste. Recently, a number of firms, acting as producer responsibility organizations in support of extended producer responsibility (EPR) regulations governing plastic and e-waste, have entered the market. These firms were excluded because their primary source of revenue is from manufacturers who pay for collection of specific materials in order to meet their EPR mandates, rather than from trading in existing markets like kabadiwalas do. Third, the firms should have an identifiable online presence (e.g. social media, news coverage etc.) beyond the platform rather than simply a downloadable app. While some firms had apps available on application platforms, we could not find any other information about them, which likely means that the app was never launched. A total of 34 firms fit these three criteria.

Upon selecting the 34 firms, we conducted a detailed analysis of their websites and mobile applications, news coverage, blogs, and their social media sites (Facebook, Twitter, Instagram, and Youtube) using Dedoose, a cloud-based qualitative data analysis tool. Based on an initial content

review, we developed codes and aggregated the codes into themes. The data were iteratively recoded based on our ongoing analysis and development of themes that are presented in the following sections of this paper. Although we consulted firms’ social media presence, we decided not to systematically review these because we found that many of their posts simply repeated information available on their website and their posts to different social media platforms were essentially identical. Accordingly, we decided to focus only on Facebook posts, and especially in cases where a firm’s website lacked crucial information.

The 34 firms provide on-demand recycling services in 30 cities or metropolitan areas of varying sizes. While 25 firms only provide services in a single city or a metropolitan area, nine firms provide services in multiple ones ranging from two to six, with an average of four cities per firm. Of the 30 cities, 21 cities have only a single firm servicing them while the rest have more than one, ranging from two to ten, with an average of four firms per city. Delhi metropolitan area which includes Delhi, Gurgaon, Faridabad, Noida and Ghaziabad has the most firms. Fig. 1 is a map depicting the number of firms that offer services in each of the 30 cities.

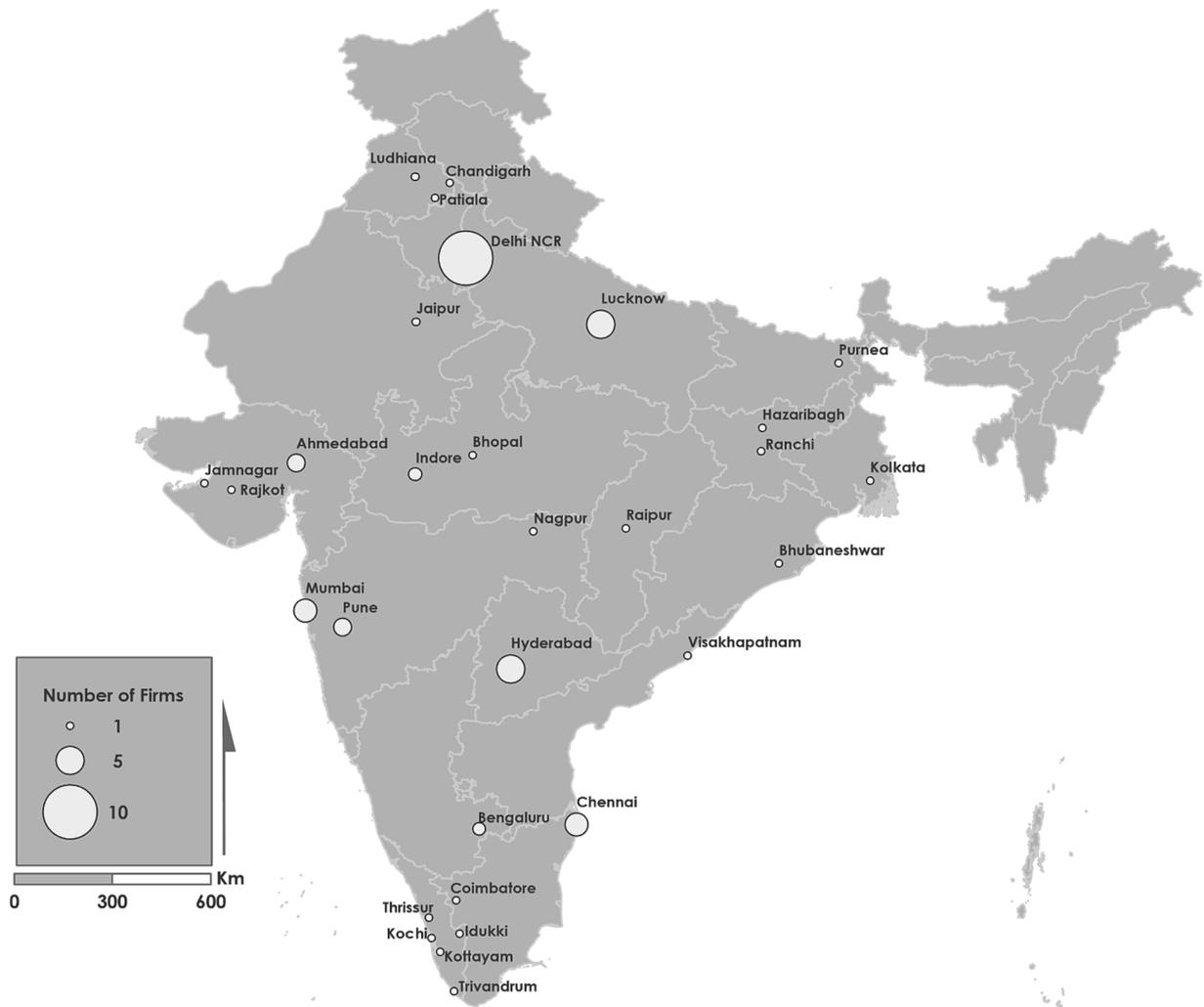
Based on a review of available digital materials, we identified and categorized the business models employed by these 34 firms. We were particularly interested in what services firms offer and how they use the platform to deliver those services, and found three main business models in use: (1) direct service provider: the firm provides recyclables collection services directly; here the platform is used as a way for the waste generator to request pick-up services; (2) intermediary: the firm serves as an intermediary connecting waste generators to collection service providers through the platform—this corresponds to the classic ‘lean’ business model typically employed by platform firms; and (3) intermediary aggregator: the firm serves as an intermediary and an aggregator; here the firm not only connects service providers to waste generators, it also buys recyclables from service providers. In the first and third case, firms buy recyclable materials either directly from waste generators or from service providers in order to aggregate larger quantities of recyclables to then sell upwards in the aforementioned recycling pyramid. Based on our analysis, 21 firms are direct service providers only, four are intermediaries only, and six are intermediary aggregators only, while four firms provide some combination of these services.

Of the 34 firms, 11 appeared inactive at the time of research. By inactive we mean that they neither had an active social media presence, nor had their websites or mobile applications been updated in 2022. Based on this information, we identified the year when the firm appeared to be last active. If they had any activity in 2022, we considered them currently active. The inactive firms appear to have been in business for 3 years on average, ranging from a minimum of less than a year to a maximum of 11 years. Fig. 2 shows the number of firms that arrived in the market each year, the number of firms that were inactive the previous year, and the cumulative total number of firms in the market in a given year.

While new firms started emerging in the early 2010s, the cumulative number of firms in the market start to show a steep increase after 2014 (Fig. 2). The following section explores some of the reasons that led to this proliferation of on-demand recycling firms.

### 4. Rise of on-demand recycling services: an untapped market?

In the mid-2010 s, the ‘uberization of everything’ circulated widely in public media, reflecting a general rise of the platform economy in various sectors, sites, and contexts globally (Curtis, 2018; Freeman, 2015; Grabar, 2015; Graham et al., 2017; Patel, 2016). The steep rise in the number of platform firms offering on-demand recycling services in urban India is in line with global trends and thus is not necessarily surprising. Other than general market trends however, a specific concatenation of policy and programmatic interventions in India, provide a framework within which this rise can be understood.



Spatial data obtained from DIVA-GIS and latlong.net

Fig. 1. Presence of on-demand recycling startups in urban India.

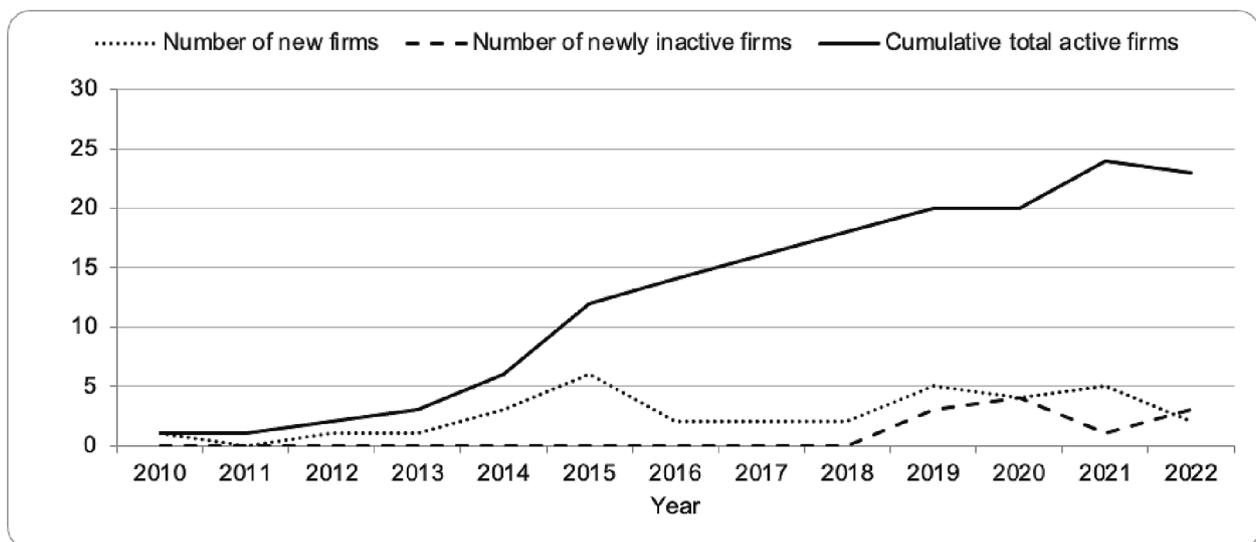


Fig. 2. Rise of on-demand recycling startups 2010–2022.

The notable increase in the number of firms after 2014 can be associated directly with the Swachh Bharat Mission (Clean India Mission, hereafter acronymized as SBM), launched that same year. Soon after Prime Minister Narendra Modi won the national elections in 2014, he launched SBM, a nationwide campaign whose initial highly publicized focus was to end open defecation by building toilets, and volunteering to clean-up visible public filth. Although modernizing waste management systems had always been on SBM's agenda, its more recent incarnation, SBM 2.0, launched in 2021, has an even more explicit focus on urban waste management, with the goal of making cities garbage-free (Prime Minister's Office, 2021).

At a Global Business Summit in January 2015, Modi described his vision for a "New Age India" in which SBM is to play a key role, particularly through the encouragement of waste entrepreneurship: "Waste management generates economic activity. It can create lakhs of swachhata [cleanliness] entrepreneurs" (Modi, 2015). A month later, an industry trade association was already celebrating waste management as the "next USD 1.5 billion opportunity for Indian industry" touting how SBM has created an "enabling environment for private sector participation" (ASSOCHAM and cKinetics, 2015, 1, 15). If, as some scholars have argued, government programs such as SBM are about more than just cleanliness, and are about the creation of entrepreneurial citizen subjects (Chacko, 2019; Gudavarthy and Vijay, 2020), then how on-demand recycling startups position themselves in relation to this program needs to be examined.

In their promotional materials, 15 of the 34 firms explicitly articulate their work in terms of supporting and drawing inspiration from SBM. Raddi Dedo, for instance, notes, "Being a responsible native of this country, we pledge to support Swachh Bharat Abhiyan by recycling the scrap" (RaddiDedo, 2021). Recykal suggests that SBM's launch "acted as a catalyst for [its] business, creating awareness about waste disposal" (Meghani, 2021). Even more pointedly, Extra Carbon says, "We started this endeavour three years ago with one target in our mind, Swachh Bharat. Fortunately, our honourable Prime Minister Narendra Modi has now made this a mission of our country" (Joshi, 2016). Responding to industry-wide celebrations of the market opportunities that SBM has opened up, startup firms often use the size of the recycling market as a way to describe the need for corporate entrepreneurship in this market space. Abhishek Deshpande, a co-founder and CEO of Recykal, says, "Waste management or w-commerce is 5x bigger than ecommerce and 10x bigger than m-commerce. India's 1.3 billion people consume products and generate waste every single day. Waste never stops. It is a pandemic-free, recession-free business" (quoted in Meghani, 2021). Another firm, Book My Scrap, notes, "Today, India's annual scrap consumption is INR 750 billion (20.40 million tons) and it imports 6.48 million tons of scrap at an estimated value of INR 390 billion to become the world's third largest importer of scrap. With a CAGR [compound annual growth rate] of 11.4%, the sector is poised to take the consumption to 30.03 million tons by 2020" (BookMyScrap, 2021).

In order to justify their entry in this market, firms cast this economic potential as unrealized, and the lack of its realization as environmentally harmful, thus aligning themselves with SBM goals. Matthew Jose of Paperman says, "India has industries to recycle 42 different kinds of waste material, like paper, plastic, glass and various types of metal. It is estimated that if all of India's recycle-able [sic] waste were given for recycling to these industries, it would amount to an industry of INR 20,000 crore (US \$4 billion)" (Ashoka, 2015). Recykal articulates its vision to manage three million metric tonnes by 2025 in the following way: "That's approximately 10–15 percent of India's waste that will flow through our system rather than end up in a landfill or ocean. Ten more companies like ours can exist in the space. It's that big a market. It's not about building an app, it's about building an ecosystem" (Meghani, 2021).

In addition to SBM, Startup India, launched in 2015 to "catalyse startup culture and build a strong and inclusive ecosystem for innovation and entrepreneurship in India," has provided further impetus for

entrepreneurship in general, and in the recycling sector more specifically (Ministry of Commerce and Industry, 2022). Startup India promises eligible companies "a host of tax benefits, easier compliance, IPR [intellectual property rights] fast-tracking & more" (Ministry of Commerce and Industry, 2022). Government efforts have proved successful; the number of startups has grown almost 20-fold over a five period between 2016 and 2021, and India is now the world's third highest producer of startups with unicorn status (Sridharan, 2022). Some scholars have argued that funding disbursed through this program has contributed to reducing regional entrepreneurial disparities between small and large cities in India (Tiwari, Hogan and O'Gorman, 2021). This might explain the emergence of on-demand recycling startups in smaller cities and not just the larger metropolitan areas (Fig. 1). To further encourage entrepreneurship in this sector, in January 2022, the Ministry of Housing and Urban Affairs (MoHUA) launched the Swachhata Startup Challenge in order to "support 10 startups working at the nexus of technology and social innovation to solve India's waste management challenges by improving efficiency of waste management, increasing social impact, improving transparency of waste value chain and reducing the use of single use plastic" (MoHUA, 2022). Two of the ten winners of the Challenge are firms studied in this paper.

But StartUp India is merely one program within a larger ecosystem of government initiatives that have enabled the rise of such startups: Digital India, Make in India, and Invest India's Waste to Wealth Mission together provide a conducive policy environment for emerging private investment in this sector. For instance, the president of the Material Recycling Association of India, notes, "Recycling has the innate capacity to play the role of a catalyst to nation building if it is aligned to announced national priorities of the government like Swachh Bharat, Make in India, and development of smart cities" (Basu 2020). One startup's founder explains, "A huge component involves generating data that's never existed before and building technology for foot soldiers who can't read English and don't know how to navigate a smartphone. We're literally 'Making in India' for a Swachh Bharat through Digital India" (Vignesh, 2016).

Unlike platform firms such as Uber which have sought governmental policy support after they had already launched (Pelzer et al., 2019), the case of on-demand recycling startups shows that a conducive policy environment was already in the making. A host of government programs focused on seemingly disparate goals of sanitation improvement, innovation using digital technology, and the inculcation of entrepreneurship, provide a frame that calls forth a particular kind of response: new investments in on-demand recycling startups. While certain governmental initiatives are designed to spur digital innovation in order to meet a market need, here an ersatz need itself must be crafted: the need to realize the unrealized economic and environmental potential of recycling. As described earlier, the economic potential of recycling is far from unrealized in reality; thousands of kabadiwalas and other actors in the informal recycling economy derive their livelihoods from it. This behooves an examination of the relationship between firms and workers in the informal recycling economy whose economic activity they attempt to capture.

## 5. Divergent framings of kabadiwalas

To claim urban India's recycling potential as unrealized in an economic and an environmental sense, startup firms frame the existing system as unable to realize that potential. Such a claim is in line with the long history of the structural devaluation of traditional forms of waste and recycling labor by the state and private capital vying to invest and extract surpluses from that business (Dias and Samson, 2016; Gidwani and Corwin, 2017; Wittmer, 2022). Paperman's Matthew Jose, for instance, asks "what's stopping us?" from recycling "all of the country's recyclable waste" and proposes two factors—"lack of a strong reason for people to recycle" and "lack of an organised waste-collection market" (Vitta, 2016). Recykal similarly complains that the existing waste

management industry in India is “cash-driven, largely informal and fragmented with multiple middlemen” (Meghani, 2021). RaddiConnect says, “When we began our ground research in 2014, the ecosystem was in disarray. It involved several players, from garbage collectors to the municipal workers, from raddiwalas (scrap dealers) to rag pickers. Worldwide reports on mounting wastes warned of an imminent catastrophe, but they continued to work at their own pace and without much interaction” (TheCityFix Labs India, 2019). ScrapUncle describes the same problem in the following way, “While traditional Kabadiwalas play the role of collecting scraps in Indian neighbourhoods, the majority of these traditional workers cherry-pick useful material and throw away the remaining waste to landfills—a hidden element of traditional Kabadiwalas that, in fact, perpetuate India’s environmental predicament” (Swapeco 2021).

While startups cast the existing informal system as deficient, they simultaneously credit them for providing inspiration for their own business models. Even the names of many of the startups—Urban Kabadi, The Kabadi, The Kabadiwala, Raddi Dedo and Raddi Connect (now Recircle)—invoke the traditional names of informal actors (kabadiwala and raddiwala). Pom Pom “borrows its name from the cheerful sound a kabadiwala’s squeeze horn makes” (Ganguly, 2016). Its founder Deepak Sethi explains the choice of the firm’s name in the following way, “Pom Pom reflects the traditional horn and sound used by the old school kabadiwalla! We felt that the name is very unique and quirky and would definitely stick in people’s minds” (So Delhi, 2018). Some startups also readily acknowledge the important environmental and economic contributions of kabadiwalas as “Green Super Heroes” (Joshi, 2016), “micro-entrepreneurs [who have been] working towards the vision of Reduce-Reuse-Recycle for years” (ReCircle, 2021). As ReCircle (2021) puts it, “The crisis of waste is not that of today. It has been around and drowning the world for decades. But little do we realise how the situation could have been much worse had it not been for the efforts of our waste workers. Tonnes of scrap each day is prevented from getting in landfills by means of collecting, segregating, and recycling.”.

More importantly however, startup firms also studied or relied on work experience in the informal market before developing their own business models. Recykal’s founder Satish Deshpande explains, “we spent the first two years going to the kabadiwalas’ and ragpickers’ houses to see what they do the whole day. Unless you go that deep, you will never understand their problems. We call it a Harvard diploma in waste management” (Meghani, 2021). Although an exception among these startups, one firm, Kabadixpress, was started by a traditional kabadiwala: “Manish started his career as a hawker buying scrap all over West Delhi on his bicycle from 1997 till 2000 ... Manish did [a] lot of hard work and didn’t [feel] any shame in doing scrap business. So, he kept growing and opened his own scrap shop in 2001 ... in order to bring professionalism & transparency in this field and to complete the supply chain in [a] legitimate way, Manish Goyal joined hands with his friends ... who are also experts in same field of waste management ... [and] decided to make Kabadixpress” (Kabadixpress, 2022).

On the one hand, existing informal systems provide the foundations for new startup firms’ business models, on the other hand, they deploy new space–time configurations to differentiate themselves from existing kabadiwalas. Kabadiwalas are hyperlocal, servicing one or a few neighborhoods within a city. By contrast, many of these firms serve entire cities, metropolitan areas (clusters of cities), and even multiple cities and metropolitan areas in different parts of the country. Customers anywhere in the firm’s service area can request a pickup using the firm’s online platform that promises just-in-time and “just-in-place” (Wells et al., 2021) service provision. By contrast, customers have to wait for a kabadiwala to come to their neighborhood in order to sell their recyclables. Firms often cast this waiting as an inconvenience that the customers can circumvent by using their platform. One firm, Scrap Uncle for instance, says, “When you decide to sell your scrap you don’t have to wait for the local Kabadiwala to come and pick the scrap from your place. Now, you can do your chores instantly, schedule your pickup

according to your comfort, and then you can find them near your doorstep” (Scrapuncle blog, 2021). Scrapwale markets itself similarly, “We understand that in this fast-paced world, time is always of the essence, we also understand your experiences with the local Kabadiwala. So, stop waiting for kabadiwala to shout out!” (Scrapwale, 2022). Time however is only one aspect of how firms market their services; the other crucial aspect has to do with the spatiality of service delivery.

While startup firms assure customers that they can provide just-in-time-and-place services, they simultaneously claim a sense of placelessness to mark their difference from the hyperlocality of the kabadiwala and increase the efficiency of market transactions. Scrap Uncle says, “Especially for homemakers, it’s a task to collect all the scrap and then take it to the nearest scrap shop. Instead of doing this, you can book your pickup online on Scrap Uncle ... Scrap Uncle is your local scrap dealer” (Scrapuncle blog, 2021, emphasis added). Recykal (2002), on the one hand, claims that “waste is never a local phenomenon” and that its platform “allows waste generators, aggregators and recyclers to connect with thousands of entities through its online marketplace.” On the other hand, it plans to “build hyper-local waste processing infrastructure” (Recykal, 2022). Recircle’s “verified resource partners, who are none other than your neighbourhood raddi waalas” are a crucial part of what it describes as its “localized systems [which] invigorate the operational aspect of resource recovery” (ReCircle, 2021, emphasis added). Paperman hopes “to go national and have a waste entrepreneur (not kabadiwallah) for every 2 km radius” (Vitta, 2016).

Because traditional markets are highly localized, platform firms claim that before they entered this market, spatially restricted transactions “created a form of geographical monopoly that resulted in incorrect pricing and inefficiency” (Bhadra and Mishra, 2021). Market inefficiencies are attributed to the abilities of existing kabadiwalas to extract monopoly rents through the use of inaccurate weighing scales and pricing; the claim is that kabadiwalas are able to cheat customers by using fraudulent weighing scales that do not reflect the true weight of items being sold, and will buy materials at lower than market prices. Because customers had no options but to sell to the neighborhood kabadiwalas, they had no way to address these asymmetries in transactions. An online marketplace ensures that customers “are no longer bound to transact with the few actors that exist in their proximity” (Recykal, 2022). Further, startups offer digital weighing scales for accurate weighing and transparent pricing by publishing price lists on their apps and websites. ExtraCarbon (2018) succinctly summarizes this proposition in the following way, “Why rely on the local raddiwalas when you have the option to sell your kabaad to the professionals.”.

These divergent framings of kabadiwalas—deficient and inefficient yet indispensable repositories of knowledge and veritable heroes of India’s recycling systems—are crucial for firms’ cooptation and displacement of traditional kabadiwalas in order to stake their claim to the market space. On the one hand, such framings are designed to convince the government and private investors that the firm is worthwhile supporting financially and otherwise. On the other hand, they are also an attempt to convince potential customers of the social, economic and environmental worthiness of and need for the firms’ disruption in this market. These divergent framings are also reflected in firms’ disparate relationships with the kabadiwalas. While some firms acknowledge that kabadiwalas served as an inspiration, and most at least acknowledge their existence, 10 of the 34 firms analyzed made no mention of them in any of their online content. While some firms purport to ‘integrate’ existing kabadiwalas into their operations in different ways, we found that most firms make no such claims, and have no aspirations to do so. As startups attempt to encroach on their market space, we identified three possible outcomes for existing kabadiwalas—non-integration, formalization, and quasi-formalization. In either case however, dispossession appears imminent.

## 6. Dispossession by platformization

If firms make no attempt to integrate existing kabadiwalas, then the most likely outcome for them is dispossession. The degree of dispossession however depends crucially on the ability of the firm to capture the customer base of existing kabadiwalas. Contrary to startups' description of the market potential as unrealized, thousands of informal workers realize that potential through their quotidian labors. Capturing a portion of the market necessarily implies displacing someone else from the market space. Twenty five of the 34 firms do not claim to 'integrate' existing kabadiwalas into their operations. The degree to which such dispossession has actually occurred remains to be seen however. Previous research on the impact of the introduction of formal garbage collection services on informal collectors in Delhi has shown that the latter managed to persist in the market by gaining and maintaining recognition from local residents "through practices that confer *practical* legitimation" (Kornberg, 2020: 800). The extent to which kabadiwalas manage to persist in this market through similar means can only be discerned through ethnographic fieldwork. What is important to note here is that startup firms can only access customers by displacing existing kabadiwalas if they do not integrate the latter into their operational models. Thus, non-integration necessarily implies dispossession of kabadiwalas.

Those that do purport to integrate, articulate the need for such integration in terms of social reform. Kabadiwalas' socio-economic position is framed as "helpless" (I Got Garbage, n.d.), "insecure and undignified" (ReCircle, 2021), and their profession as "unglamorous and unrewarding" (Mindtree, 2018). Framed as such, firms that do claim to be "helping" them "reform their lives and gain respectability" (Mindtree, 2018), bringing "stability to their jobs and life" (ReCircle, 2021), empowering them (I Got Garbage, n.d.), and enhancing their lives "by continuously addressing their interactions and living conditions" (ScrapQ 2020). As Bintix describes, "our mission is to provide scheduled recyclable collection at your doorstep while at the same time work towards a zero landfill future and do it in a green way that's inclusive of India's scrap dealers and waste pickers" (Bintix 2020). Such a framing of kabadiwalas as objects of social intervention rather than as economic subjects justifies the firm's need for disruption in the market space. But firms purport to integrate kabadiwalas into their business operations in different ways.

If firms employ existing kabadiwalas as wage labour, then this is formalization in a strict sense, that is, previously self-employed informal workers become formal employees of the firm. Doing so involves giving them "pay, pension and insurance" (Bintix 2020). If firms integrate them not as formal employees but as workers who continue to be self-employed, this is what we describe as quasi-formalization drawing on O'Hare's (2020: 63) definition of the term as incomplete formalization "where informal economic activity continues to subsidise a reorganised formal market in urban recyclables." As Recykal (2022) describes this relationship, "We have merely tied up with local kabadiwalas, aggregators and recyclers and pay them for their services. We provide the tech and logistics to enable waste to get properly disposed. We are like the Uber for Trash."

Often formalized and quasi-formalized workers undergo processes of "police verification" (ScrapBuk, 2022) and professional training on "work ethics and customer relations" (Scrapzon, 2021) as a pre-requisite for them to become the firm's "verified resource partners" (Extra Carbon, n.d.). Scrapzon (2021) promises that its "executives [kabadiwalas]" are "well educated, polite, friendly, and driven by [a] passion for customer service." Quasi-formalized workers are seen as "independent entrepreneurs" who can deploy "innovative microbusiness models that would enable them to deliver structured waste-management services directly to waste generators" (Mindtree, 2018), improving their "business practices" (Ahmed et al., 2022), and turning them into "decent corporate citizens" (The Kabadiwala n.d.). While quasi-formalized workers are not paid wages or fringe benefits as employees would be,

some firms promise to fulfill "basic needs of these people such as Aadhaar card, bank accounts, insurance, safety kits, education and health-care" through funding from their corporate social responsibility arms, not as part of their contract with the firms (Recykal, 2022).

Of the nine firms that do purport to 'integrate' kabadiwalas, two employ them as wage labor, six engage them as quasi-formalized workers, and one relies on a combination, employing some as wage labour and engaging others as quasi-formalized workers. But firms' relationships with existing kabadiwalas vary by business model (Table 1). The totals in Table 1 exceed the total number of firms studied in this paper because four firms deploy a combination of business models, and one firm integrates kabadiwalas as both formalized wage labor as well as quasi-formalized non-employees.

Scholars of platform economies argue that the generative force of the platform relies on practices of intermediation and the intermediary logic of platforms relies on the creation and coordination of network effects (Grabher and König, 2020; Langley and Leyshon, 2017). In a platform business model, the marginal cost of upscaling a platform is relatively low as compared to the capital required for achieving economies of scale in traditional business models (Grabher and van Tuijl, 2020). Such platform firms are 'lean', that is, they do not own assets and are not in the business of 'producing' things themselves; instead, they connect consumers to service providers. One would assume that on-demand recycling start-ups in India follow a similar model, that is, connect the generators of recyclable materials to buyers of those materials, a model that Recykal (2022) describes as the "Uber for Trash." In the typology above, we would expect firms to act as intermediaries connecting quasi-formalized kabadiwalas with customers, if indeed a 'lean' business model were the norm.

Yet, such a business model appears to be least preferred by startups; there are only two firms in our dataset that do so. By contrast, the dominant model is direct service provision that does not rely on existing kabadiwalas. Further, although the number of firms in this sector is too few to draw any definitive conclusions, it appears that firms are more likely to integrate kabadiwalas as quasi-formalized workers than as formalized employees if they are intermediaries or intermediary aggregators rather than if they are direct service providers. Both of these characteristics of on-demand recycling startups—the dominant business model and the variation in firms' engagement with existing kabadiwalas based on business model—can be explained by the nature of the business. The structure of existing recycling markets constrains platform firm's operational model choices (Kumar, 2020).

Collection of recyclable materials rather than merely mediating connections between buyers and sellers of those materials, appears to be the cornerstone of firms' business strategy in this market. Thirty one of the 34 firms are in the business of buying, aggregating and selling recyclable materials. As described earlier, recyclables move along the chain from waste generators to kabadiwalas to small dealers to large dealers to suppliers (buyers of specific types of recyclable materials) and eventually to reprocessors that convert those materials into new commodities. The further along the chain one is, the better the price for the materials being traded (Agarwal et al., 2005). The purchase and sale price that any actor along the chain can command depends on the number of transactions that have already occurred and the number of future transactions expected to occur in trading those materials (Gill, 2009). In other words, the greater one's ability to disintermediate, the

**Table 1**  
Number of firms by business model and relationship with existing kabadiwalas.

	Direct service provider	Intermediary	Intermediary aggregator
No integration	21	3	4
Formalization	3	0	1
Quasi-formalization	2	2	5

higher the profit margin. Unlike other platform firms such as Urban Company that attempt to capture informal labor, the goal here is to capture recyclable materials.

Disintermediation implies dispossession of intermediaries such as kabadiwalas and small scrap dealers who typically themselves “cannot cut out middlemen since they do not have the cash capacity to build up adequate volumes” of recyclables” (Gill, 2009, p.17). New startup firms, often funded by venture capital and supported by a conducive policy environment, have vastly different resources and capacities to deploy “different combinations of storage, time, and labour” to disintermediate than those “at the lower levels of the chain” who are much more “constrained in their actual ability to cut out middlemen and sell to the furthest end-point traders” (Gill, 2009, p.17). The lean business model isn’t really the most profitable model for new startups in the recycling sector where marginal returns increase with volume. By operating at a large enough scale, firms hope to aggregate enough materials by recruiting enough customers and selling to buyers further along the chain in order to increase their profit margins. If they are able to do so, they only need to be marginally price competitive with kabadiwalas but can claim much greater profit margins as long as they can aggregate sufficiently large quantities of recyclables. Direct service providers buy directly from waste generators and sell to the furthest buyer along the chain, thus cutting out the kabadiwalas and other intermediaries from the chain. But this strategy can be costly.

Collection and transportation tend to be expensive. For instance, collection and transportation alone account for more than 80 percent of municipal budgets allocated to waste management in India (Luthra, 2020). For this reason, some firms such as Kabadiexpress and Junkart demand a minimum order amount before they agree to scheduling a pickup. Other firms, flush with venture capital, might be able to afford to detach the price they pay for recyclables from actual collection costs incurred. By offering cost saving promotions to users, such as omitting the minimum weight requirement mandated by some firms, these firms can attract new users and grow their network even as they incur losses in the short term. Recykal, for instance, recording a net profit for the first time in 2021, conducted an average of 1,000 loss-making orders a day for nearly two years in its infancy (Meghani, 2021).

High collection and transportation costs can also help explain why some firms, particularly intermediary aggregators, might choose to quasi-formalize. Half of the intermediary aggregators in our sample chose to quasi-formalize existing informal workers rather than hiring their own collectors. Through quasi-formalization, these firms can outsource collection to kabadiwalas, who then sell the materials they collect to the firms they are affiliated with. ReCircle (2022), for instance, claims to “procure materials from [kabadiwalas] at fair market prices.” The discursive framing of kabadiwalas as those who need to be ‘uplifted’ or ‘empowered’ legitimizes firms’ strategy of quasi-formalized integration. In the process, kabadiwalas who, contrary to the claims of some startups, were already “independent entrepreneurs,” (Mindtree, 2018) might actually be transformed into “platform-dependent entrepreneurs” with higher levels of risk and uncertainty adding to their precarity (Cutolo and Kenney 2021). How quasi-formalized kabadiwalas experience and manage this platform-dependence remains to be examined through future ethnographic fieldwork however. Athique (2020: 33) has argued that unlike platform economies in the industrialized world, a major opportunity for platform firms in India does not lie in “outsourcing labour costs but in capturing informal economic activity, formalizing those markets and bringing them in the ambit of transactional records.” The case of intermediary aggregators suggests that this may not hold for all platform recycling startups; cutting labor costs through outsourcing collection continues to be important for some firms in this market.

But why do kabadiwalas agree to become quasi-formalized workers? Presumably the motivations for kabadiwalas agreeing to such an arrangement is the threat of dispossession, the use of the platform, and thus potential access to a wider customer base and better prices. Indeed, firms use this strategy to enroll them into their network. One scrap

dealer working with Paperman for instance says, “My father was a rag-picker, and my family has been in this business for over 50 years. We have established customers, but it is always hard to find new ones” (quoted in BBC News, 2012). A video designed by Junkart to attract kabadiwalas into their network features a kabadiwala complaining about being “tired of roaming around ... still unable to get sufficient scrap” (Junkart 2016). To these tired kabadiwalas, Junkart promises “no more roaming around” and thus a solution that allows them to “work efficiently” (Junkart, 2016). Recykal (2022) offers them the ability to disintermediate: “Recykal has also onboarded small kabadiwalas on to the system who would previously sell to larger aggregators. Through the app, they can skip the middlemen and sell directly to recyclers, earning an extra 10 percent ... It also helps in optimizing their operations by providing information about nearby waste generators from whom they can collect and also waste aggregators and recyclers that are willing to purchase the waste.”

The degree to which quasi-formalized kabadiwalas benefit from this relation however depends on the expansion of their customer base and/or the prices at which firms buy materials from them. In either case however, these benefits depend on the dispossession of non-integrated kabadiwalas and other intermediaries along the recycling chain. Expansion of the customer base of a quasi-formalized kabadiwala implies encroaching upon and capturing the customer base of a non-integrated kabadiwala. The ability of the firm to offer better prices than what the quasi-formalized kabadiwalas would have received previously, depends on its ability to disintermediate, that is to skip the intermediaries and sell to the furthest buyer along the recycling chain. Thus, despite startups’ claims to ‘help’ and ‘empower’ kabadiwalas, even in the best-case scenario, where some existing kabadiwalas are integrated into a firm’s operations, dispossession of others is part of the same process. Platform model’s network effects can only expand the scale of dispossession. And as it does so, it will also undercut any temporary gains that quasi-formalized kabadiwalas from their integration in the system. As has been observed in the case of ride hailing platforms, the potential earnings of each individual worker decrease as the firm expands the network and fills the market with new workers (von Vocano, 2021). The dispossession of existing informal workers depends on the extent to which new platform firms are successful in capturing informal recycling markets, a process that can be understood then as dispossession by platformization. The primary means through which dispossession by platformization proceeds however is not through the proletarianization of labor, but the corporatized commodification of their resources or recyclable materials (Glassman, 2006; Levien, 2012).

## 7. Conclusion

While the rise of on-demand recycling start-up firms in urban India can be explained partly by a general economic trend towards platformization, a pre-existing enabling policy environment has been particularly conducive to their growth. Unlike platform firms in other sectors however, these firms use a range of business models in their attempts to eke out profits in a well-established and structured market that includes a number of intermediary players. A ‘lean’ business model does not emerge as the most preferable because profits depend on capturing recyclable materials rather than existing informal labor. Associated with the most prevalent direct service provision model is the non-integration of existing kabadiwalas into startups’ business operations. The outright dispossession of kabadiwalas is thus the most likely outcome if these firms are able to gain a significant market share. Even in the few cases where existing workers are integrated as formalized or quasi-formalized workers, the overall likely effect is the dispossession of non-integrated workers and increased levels of precarity for integrated workers. Thus, the rise of on-demand recycling can be described as dispossession by platformization, a material process that is discursively enabled through divergent framings of informal recycling work and workers.

While this paper provides new insights into the heterogeneous landscape of on-demand recycling in urban India, it relies primarily on a content analysis of firms' marketing strategies on their websites and social media, and news coverage. The use of such a passive method of data collection has limitations. First, it does not allow us to interrogate more deeply the factors that lead firms to choose among different business models, that more active data collection methods such as interviews might allow for. Second, our methods do not allow us to get a sense of the changing nature of work and workers in this sector. For instance, neither do we have a clear understanding of the reasons why kabadiwalas choose to be integrated into or partner with these new firms, nor a sense of what kabadiwalas think of the changing landscape of the recycling market. Likewise, we neither have a sense of the degree to which kabadiwalas have actually been displaced, nor the practices through which their claims to the market space might persist despite the attempts of startups. Third, while we have a general understanding of the growth of firms in this landscape, we do not have a clear sense of the extent to which these firms are successful in making a dent in the market. The extent of their customer base, the amount of materials they channel using the platform, or the portion of the market that they have been able to claim, remain open questions.

Limitations aside, the insights from this analysis nonetheless provide useful cues for building a political strategy for workers whose livelihoods are being threatened due to platformization. In the extant literature on the topic, much of the focus is on workers within platform firms and the strategies for organizing and collective bargaining they are deploying or could engage in (Graham et al., 2020; Johnston, 2020; Jones, 2021; Cieslik, 2021), and not necessarily the non-platform workers competing in the same market. Some scholars who have studied platformization of informal economic activities point to the creative possibilities inherent in improvisation as a way to respond to their dispossession (Frey, 2020; Rai, 2020). Some have suggested state intervention in the market to protect informal workers (Arias, 2019; Devries, 2018). Yet others have called for platform cooperativism—collective ownership of the platform as a post-capitalist response (Chatterton and Pusey, 2020; Papadimitropoulos, 2021; Srnicek, 2017).

Some organizations and firms in the on-demand recycling space could be categorized as attempting to become platform cooperatives in the sense that the platform was intended to benefit informal workers rather than make profits. Two of the 'firms' analyzed in this paper (Pick My Trash and I Got Garbage) were started by relatively well known non-governmental organizations (NGOs) that have been advocating for livelihood security for informal recyclers in urban India for over two decades. These could be thought of as platform cooperatives even though the idea of the platform didn't emerge from the grassroots, that is from the informal workers themselves, thus they might not be considered platform cooperatives in a strict sense. Both of these organizations' platforms have largely failed, or at least are currently inactive. Although we do not know the precise reasons for their failure, the kinds of technological expertise and resources they might continually need in order to effectively compete with startups that have much larger amounts of capital at their disposal, puts the effectiveness of such a strategy in question. The ability of collectives of kabariwalas, who are likely to be able to command even fewer resources than NGOs, to build or buy and then maintain such platforms is even more questionable. In light of this, we are inclined to agree with scholars such as Sandoval (2020) who question the entrepreneurial activism of platform cooperativism on the grounds that it aligns with the very neoliberal logic it attempts to overcome, urging that such cooperatives instead use their political voice to demand structural reform.

But collective ownership of platforms requires collective organizing and political mobilization as a precondition. Unlike wastepickers who are in some cases, rather well-organized, and mobilize collectively to lobby the state, kabadiwalas are less so, primarily because they have not needed to be (Gill, 2009). Recall that unlike waste management that is within the ambit of municipal responsibility, trade in high-value

recyclables is largely a private affair. Because waste management, and consequently the extraction of low-value recyclables, is regulated as a municipal service, informal waste management service providers have been able to carve a space for themselves in official policy. While we are cognizant of the concerns that many scholars have raised related to the adverse consequences of gaining state recognition and associated processes of formalization (Anantharaman, 2019; Millar, 2018; O'Hare, 2020; Tucker, 2017; Tucker and Anantharaman, 2020), this form of regulatory inclusion has nonetheless provided some informal workers a foundation from which they can wage broader struggles to make claims in the market. Without policy intervention, kabadiwalas and associated actors in the informal recycling economy will be forced to compete against startups with vastly different amounts of resources and capacities at their disposal. Therefore, while platform collectivisation might be a laudable goal, we suggest that collective organization among kabadiwalas and state intervention in the recycling sector are more immediately necessary if kabadiwalas' imminent struggles for their livelihoods are to bear fruit. The nature of state intervention necessary can only be a result of a deliberative process of collective organizing and action however.

#### CRediT authorship contribution statement

**Aman Luthra:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Supervision. **Jake Lowe:** Methodology, Formal analysis, Investigation, Data curation, Writing – review & editing, Visualization. **Karina Ochoa Berkley:** Methodology, Formal analysis, Investigation, Data curation, Writing – review & editing, Visualization.

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Data availability

Data will be made available on request.

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#### References

- Agarwal, A., Singhmar, A., Kulshrestha, M., Mittal, A., 2005. Municipal solid waste recycling and associated markets in Delhi, India. *Resour. Conserv. Recycl.* 44 (1), 73–90. <https://doi.org/10.1016/j.resconrec.2004.09.007>.
- Ahmed, Jashim Uddin, Quazi Tafsirul Islam, Asma Ahmed, and Sakib Bin Amin, 2022. Extending resource value-based circular economy business model in emerging economies: lessons from India. *Bus. Perspect. Res.*, February, 22785337211070364. <https://doi.org/10.1177/22785337211070363>.
- Anantharaman, H., 2019. Neo-liberalising inclusion? Waste Picking, data activism, and the state. *Econ. Pol. Wkly* 54 (47), 61–67.
- Arias, J., 2019. "Informal Vendors in Johannesburg, South Africa". Penn IUR Series on Informality. Penn Institute of Urban Research, Philadelphia.
- Ashoka, 2015. "Matthew Jose – Ashoka Fellow." Ashoka, 2015. <https://www.ashoka.org/en-ch/fellow/matthew-jose>.
- ASSOCHAM, and cKinetics, 2015. VOW: Value Out of Waste. ASSOCHAM and cKinetics, New Delhi.
- Athique, Adrian, Vibodh Parthasarathi (Eds.), 2020. Platform Capitalism in India. *Global Transformations in Media and Communication Research - A Palgrave and IAMCR Series*. Springer International Publishing, Cham. 10.1007/978-3-030-44563-8.
- Athique, Adrian, 2020. Digital Emporiums: Evolutionary Pathways to Platform Capitalism. In: Platform Capitalism in India, edited by Adrian Athique and Vibodh Parthasarathi. Springer International Publishing, Cham, pp. 23–42.

- Attoh, K., Wells, K., Cullen, D., 2019. 'We're Building Their Data': Labor, alienation, and idiocy in the smart city. *Environ. Plann. D: Soc. Space* 37 (6), 1007–1024. <https://doi.org/10.1177/0263775819856626>.
- BBC News, 2012. India's Rag-Pickers Inspire Recycling Charity, February 18, 2012, sec. India. <https://www.bbc.com/news/world-asia-india-16961041>.
- Bhadra, U., Mishra, P.P., 2021. Extended producer responsibility in India: evidence from Recykal, Hyderabad. *J. Urban Manage.* 10 (4), 430–449. <https://doi.org/10.1016/j.jum.2021.07.003>.
- BookMyScrap, 2021. "BookMyScrap." BookMyScrap, 2021. <https://bookmyscrap.com/about-us/>.
- Chacko, P., 2019. Marketizing *Hindutva* : The state, society, and markets in Hindu nationalism. *Mod. Asian Stud.* 53 (2), 377–410. <https://doi.org/10.1017/S0026749X17000051>.
- Chatterjee, P., 2008. Democracy and economic transformation in India. *Econ. Pol. Wkly* 43 (16), 53–62. <http://www.jstor.org/stable/40277640>.
- Chatterton, P., Pusey, A., 2020. Beyond capitalist enclosure, commodification and alienation: postcapitalist praxis as commons, social production and useful doing. *Prog. Hum. Geogr.* 44 (1), 27–48. <https://doi.org/10.1177/0309132518821173>.
- Chaturvedi, Bharati, Vinay Gidwani. 2010. The Right to Waste: Informal Sector Recyclers and Struggles for Social Justice in Post-Reform Urban India. In: Waqar Ahmed, Amitabh Kundu, Richard Peet, 0 (Ed.), *India's New Economic Policy: A Critical Analysis*, Routledge, pp. 125–53. 10.4324/9780203846810.
- Chikarmane, P., 2016. Public space, public waste, and the right to the city. *NEW SOLUTIONS: J. Environ. Occup. Health Policy* 26 (2), 289–300. <https://doi.org/10.1177/1048291116652689>.
- Chintan, 2003. *Space for Waste: Planning for the Informal Recycling Sector*. Chintan Environmental Research and Action Group, New Delhi [https://www.chintan-india.org/sites/default/files/2019-08/chintan\\_study\\_space\\_for\\_waste.pdf](https://www.chintan-india.org/sites/default/files/2019-08/chintan_study_space_for_waste.pdf).
- Cieslik, Katarzyna, Roland Banya, Bhaskar Viru, 9/21. Offline contexts of online jobs: platform drivers, decent work, and informality in Lagos, Nigeria. *Dev. Policy Rev* 40 (4), e12595. 10.1111/dpr.12595.
- Curtis, Matt, 2018. The Uber-ization of Everything. VRM Intel, June 13, 2018. <https://vrmintel.com/the-uber-ization-of-everything/>.
- Davies, H., Goodley, S., Lawrence, F., Lewis, P., O'Carroll, L., Cutler, S., 2022. Uber broke laws, duped police and secretly lobbied governments, leak reveals. *The Guardian*. <https://www.theguardian.com/news/2022/jul/10/uber-files-leak-reveals-global-lobbying-campaign> (Accessed June 22).
- Demaria, F., Schindler, S., 2016. Contesting urban metabolism: struggles over waste-to-energy in Delhi, India. *Antipode* 48 (2), 293–313. <https://doi.org/10.1111/anti.12191>.
- DeVries, Danielle Nicole, 2018. Exploring the dangerous disconnect between perspectives, planning, policy, and practice towards informal traders in Durban, South Africa. *Berkeley Plan. J.* 30 (1), 44–69. <https://doi.org/10.5070/BP330137614>.
- Dias, S., 2016. *Waste pickers and cities*. *Environ. Urban.* 28 (2), 375–390.
- Dias, S.M., Samson, M., 2016. "Informal Economy Monitoring Study Sector Report: Waste Pickers". Informal Economy Monitoring Study. WIEGO, Cambridge, MA <https://www.wiego.org/sites/default/files/publications/files/Dias-Samson-IEMS-Waste-Picker-Sector-Report.pdf>.
- Doron, A., Jeffrey, R., 2018. *Waste of a Nation: Garbage and Growth in India*. Harvard University Press, Cambridge, MA <https://www.hup.harvard.edu/catalog.php?isbn=9780674980600>.
- Extra Carbon. n.d. "Extra Carbon." <https://extracarbon.wordpress.com/> (Accessed May 3, 2022).
- ExtraCarbon., 2018. May 9). "Why rely on the local raddiwalas when you have the option to sell your kabaad to the professionals". Facebook. <https://www.facebook.com/Extracarboncom/posts/>.
- Freeman, Sunny, 2015. Are You Ready For The 'Uberization' Of The World? *HuffPost*, April 1, 2015, sec. Business. [https://www.huffingtonpost.ca/2015/04/01/uberization-of-everything\\_n\\_6971752.html](https://www.huffingtonpost.ca/2015/04/01/uberization-of-everything_n_6971752.html).
- Frey, B., 2020. Platform labor and in/formality: organization among motorcycle taxi drivers in Bandung, Indonesia. *Anthropol. Work. Rev.* 41 (1), 36–49. <https://doi.org/10.1111/awr.12187>.
- Ganguly, Paloma, 2016. "Don't Throw Away Your Toothpaste Tubes or Shoeboxes. This Startup Will Pay for It." *Tech in Asia*. September 16, 2016. <https://www.techinasia.com/pom-pom-recycles-waste>.
- Graham, M., Hjorth, I., Lehdonvirta, V., 2017. Digital labour and development: impacts of global digital labour platforms and the gig economy on worker livelihoods. *Transfer: European Review of Labour and Research* 23, 135–162. <https://doi.org/10.1177/1024258916687250>.
- Gidwani, V., 2013. Six theses on waste, value, and commons. *Soc. Cult. Geogr.* 14 (7), 773–783. <https://doi.org/10.1080/14649365.2013.800222>.
- Gidwani, V., Corwin, J., 2017. *Governance of waste*. *Econ. Pol. Wkly* 52 (11), 44–54.
- Gill, K., 2009. *Of Poverty and Plastic: Scavenging and Scrap Trading Entrepreneurs in India's Urban Informal Economy*. Oxford University Press, New Delhi.
- Glassman, J., 2006. Primitive accumulation, accumulation by dispossession, accumulation by 'Extra-Economic' means. *Prog. Hum. Geogr.* 30 (5), 608–625. <https://doi.org/10.1177/0309132506070172>.
- Grabar, Henry, 2015. "The Uber-ization of Everything." *Salon*, January 11, 2015, sec. Innovation. [https://www.salon.com/2015/01/10/the\\_uber\\_ization\\_of\\_everything/](https://www.salon.com/2015/01/10/the_uber_ization_of_everything/).
- Grabher, G., König, J., 2020. Disruption, embedded. A Polyanian framing of the platform economy. *Sociologica* 14 (1), 95–118. <https://doi.org/10.6092/issn.1971-8853/10443>.
- Grabher, G., van Tuijl, E., 2020. Uber - production: from global networks to digital platforms. *Environ. Plan. A: Econ. Space* 52 (5), 1005–1016. <https://doi.org/10.1177/0308518X20916507>.
- Graham, M., Woodcock, J., Heeks, R., Mungai, P., Van Belle, J.-P., du Toit, D., Fredman, S., Osiki, A., van der Spuy, A., Silberman, S.M., 2020. The fairwork foundation: strategies for improving platform work in a global context. *Geoforum* 112 (June), 100–103. <https://doi.org/10.1016/j.geoforum.2020.01.023>.
- Gudavarthy, A., Vijay, G., 2020. Social policy and political mobilization in india: producing hierarchical fraternity and polarized differences. *Dev. Chang.* 51 (2), 463–484. <https://doi.org/10.1111/dech.12581>.
- Hayami, Y., Dikshit, A., Mishra, S., 2006. Waste pickers and collectors in Delhi: Poverty and environment in an urban informal sector. *The Journal of Development Studies* 42, 41–69. <https://doi.org/10.1080/00220380500356662>.
- I Got Garbage, n.d. "I Got Garbage." 2022. <https://www.igotgarbage.com/> (Accessed June 22).
- Johnston, H., 2020. Labour geographies of the platform economy: understanding collective organizing strategies in the context of digitally mediated work. *Int. Labour Rev.* 159 (1), 25–45. <https://doi.org/10.1111/ilr.12154>.
- Jones, P., 2021. *Work without the Worker: Labour in the Age of Platform Capitalism*. Verso, London.
- Joshi, Gaurav, 2016. "ExtraCarbon: The Green Super Heroes That Turn Your Old Items and Recyclables into Cash or Points." *BW Disrupt*. <http://bwdisrupt.businessworld.in/article/ExtraCarbon-The-Green-Super-Heroes-That-Turn-Your-Old-Items-and-Recyclables-into-Cash-or-Points-10-06-2016-99047> (Accessed 19 Aug. 2022).
- The Kabadiwala, n.d. "The Kabadiwala | Sell Scrap Online." n.d. <https://www.thekabadiwala.com/> (Accessed May 3, 2022).
- Kabadixpress, 2022. "Kabadixpress - Scrap Buyers in Delhi|Aluminium & Iron Scrap Purchasers." 2022. <https://www.kabadixpress.com/>.
- Kaye-Essen, C.W., 2020. 'Uberization' as Neoliberal Governmentality: A Global South Perspective. *Journal of Asian and African Studies* 55, 716–732. <https://doi.org/10.1177/0021909619894616>.
- Kornberg, D., 2020. Competing for jurisdiction: practical legitimation and the persistence of informal recycling in urban India. *Soc. Forces* 99 (2), 797–819. <https://doi.org/10.1093/sf/soz169>.
- Kumar, A., 2020. Informality in the Time of Platformization. In: Athique, A., Parthasarathi, V. (Eds.), *Platform Capitalism in India*. Springer International Publishing, Cham, pp. 261–280.
- Langley, P., Leyshon, A., 2017. Platform capitalism: the intermediation and capitalization of digital economic circulation. *Finance Soc.* 3 (1), 11–31. <https://doi.org/10.2218/finso.v3i1.1936>.
- Levien, M., 2012. The land question: special economic zones and the political economy of dispossession in India. *J. Peasant Stud.* 39 (3–4), 933–969. <https://doi.org/10.1080/03066150.2012.656268>.
- Luthra, A., 2020. Efficiency in waste collection markets: changing relationships between firms, informal workers, and the state in urban India. *Environ. Plan. A: Econ. Space* 52 (7), 1375–1394.
- Luthra, A., 2021. Housewives and maids: the labor of household recycling in urban India. *Environ. Plan. E: Nat. Space* 4 (2), 475–498. <https://doi.org/10.1177/2514848620914219>.
- Luthra, Aman, William Monteith, 2021. Of market vendors and waste collectors: labour, informality, and aesthetics in the era of world-class city making. *Antipode*, September, anti.12784. <https://doi.org/10.1111/anti.12784>.
- Meghani, Varsha. 2021. How Recykal Is Cleaning Up The Mess. *Forbes India*, September 2, 2021. <https://www.forbesindia.com/article/take-one-big-story-of-the-day/how-recykal-is-cleaning-up-the-mess/70177/1>.
- Millar, K., 2018. *Reclaiming the Discarded: Life and Labor on Rio's Garbage Dump*. Duke University Press, Durham.
- Mindtree, n.d. "I Got Garbage 2017-2018 | Mindtree." <https://www.mindtree.com/about/investors/annual-reports/annual-report-2017-2018/tree-always-gives-back/i-got-garbage> (Accessed June 22, 2022).
- Ministry of Commerce and Industry, 2022. "Startup India." <https://www.startupindia.gov.in/content/sih/en/home-page.html>.
- Modi, Narendra, 2015. Economic Times Global Business Summit: Key Points of PM Narendra Modi's Address. *The Economic Times*, January 17, 2015. <https://economic-times.indiatimes.com/news/economy/policy/economic-times-global-business-summit-key-points-of-pm-narendra-modis-address/articleshow/45914598.cms?from=mdr>.
- MoHUA, 2022. "Swachhata Startup Challenge." 2022. <https://swachhatastartupchallenge.com/>.
- Nowak, Samuel, 2021. The social lives of network effects: speculation and risk in Jakarta's platform economy. *Environ. Plan. A: Econ. Space*, November, 0308518X211056953. <https://doi.org/10.1177/0308518X211056953>.
- O'Hare, P., 2020. 'We Looked after People Better When We Were Informal': The 'Quasi-Formalisation' of Montevideo's waste-pickers. *Bull. Lat. Am. Res.* 39 (1), 53–68. <https://doi.org/10.1111/blar.12957>.
- Papadimitropoulos, E., 2021. Platform capitalism, platform cooperativism, and the commons. *Rethink. Marx.* 33 (2), 246–262. <https://doi.org/10.1080/08935696.2021.1893108>.
- Patel, Sameer. 2016. In Defense of the Uber-ization of Everything. *TechCrunch*, June 19, 2016. <https://social.techcrunch.com/2016/06/19/in-defense-of-the-uber-ization-of-everything/>.
- Pelzer, P., Frenken, K., Boon, W., 2019. Institutional entrepreneurship in the platform economy: how Uber tried (and failed) to change the Dutch taxi law. *Environ. Innov. Soc. Trans.* 33 (November), 1–12. <https://doi.org/10.1016/j.eist.2019.02.003>.
- Prime Minister's Office, 2021. *PM to Launch Swachh Bharat Mission-Urban 2.0 and AMRUT 2.0 on 1st October*. Press Release. Press Information Bureau. September 30, 2021.
- RaddiDedo, 2021. "RaddiDedo." Raddidedo. 2021. <https://raddidedo.com/>.

- Rai, A., 2020. Capitalist Platforms and Subaltern Creativity. In: Athique, A., Parthasarathi, V. (Eds.), *Platform Capitalism in India*. Springer International Publishing, Cham, pp. 299–315.
- Raval, Noopur, Joyjeet Pal. 2019. Making a 'Pro': 'Professionalism' after Platforms in Beauty-Work. In: *Proceedings of the ACM on Human-Computer Interaction 3 (CSCW)*, pp. 175:1–175:17. <https://doi.org/10.1145/3359277>.
- ReCircle, 2021. "ReCircle - Recover, Recycle, Rethink." ReCircle. 2021. [https://recircle.in/web\\_service\\_pickup/](https://recircle.in/web_service_pickup/).
- Recykal, 2022. "Recykal." Recykal. 2022. <https://recykal.com/>, <https://recykal.com/>.
- Samson, M., 2015. Accumulation by dispossession and the informal economy – struggles over knowledge, being and waste at a Soweto garbage dump. *Environ. Plan. D: Soc. Space* 33 (5), 813–830. <https://doi.org/10.1177/0263775815600058>.
- Sandoval, M., 2020. Entrepreneurial activism? Platform cooperativism between subversion and co-optation. *Crit. Socio.* 46 (6), 801–817.
- Sanyal, K.K., 2007. *Rethinking Capitalist Development: Primitive Accumulation, Governmentality, and Post-Colonial Capitalism*. Routledge, New Delhi; New York.
- Scrapbuk, n.d. "Sell Scrap Online | Scrap Buyer and Dealer." <https://scrapbuk.com/> (Accessed May 3, 2022).
- Scrapuncle, 2021. "Why Sell Scrap Online - Era of Online Kabadiwalas." Scrapuncle Blog (blog). 2021. <https://blog.scrapuncle.com/>.
- Scrapwale, 2022. "Scrapwale." [https://play.google.com/store/apps/details?id=com.sysfo.Scrapwale&hl=en\\_US&gl=US](https://play.google.com/store/apps/details?id=com.sysfo.Scrapwale&hl=en_US&gl=US).
- Scrapzon, 2021. "Sell Scrap in Hyderabad & Secunderabad – Scrap Sell & Recycling." n.d. 2022. <https://scrapzon.com/> (Accessed November 17).
- So Delhi, 2018. "We Just Had a Tryst With Deepak Sethi, The Pioneering Founder of Pom Pom Trash to Cash," April 27, 2018, sec. Lifestyle. <https://so.city/delhi/article/we-just-had-a-tryst-with-deepak-sethi-the-pioneering-founder-of-pom-pom-trash-to-cash>.
- Sridharan, Srinath, 2022. "Need to Fast-Track IPR Recognition." *Financialexpress* (blog). February 8, 2022. <https://www.financialexpress.com/opinion/need-to-fast-track-ipr-recognition/2427972/>.
- Srnicek, N., 2017. *Platform Capitalism*. Polity Press, Cambridge, UK.
- Stehlin, J., Hodson, M., McMeekin, A., 2020. Platform mobilities and the production of urban space: Toward a typology of platformization trajectories. *Environ Plan A* 52, 1250–1268. <https://doi.org/10.1177/0308518X19896801>.
- Surie, A., 2020. On-demand platforms and pricing: how platforms can impact the informal urban economy, evidence from Bengaluru, India. *Work Org., Labour Global.* 14 (1), 83–100. <https://doi.org/10.13169/workorglaboglob.14.1.0083>.
- Surie, Aditi, Jyothi Koduganti, 2016. The emerging nature of work in platform economy companies in Bengaluru, India: the case of Uber and Ola cab drivers. *E-J. Int. Compar. Labour Stud.*, October. [http://ejcls.adapt.it/index.php/ejcls\\_adapt/article/view/224](http://ejcls.adapt.it/index.php/ejcls_adapt/article/view/224).
- TheCityFix Labs India. 2019. How This Mumbai-Based Duo's Startup Is Solving Waste Management Using Tech. *YourStory.Com*, February 5, 2019. <https://yourstory.com/2019/02/mumbai-waste-management-startup-raddiconnect/amp>.
- Ticona, J., Mateescu, A., 2018. Trusted strangers: carework platforms' cultural entrepreneurship in the on-demand economy. *New Media Soc.* 20 (11), 4384–4404. <https://doi.org/10.1177/1461444818773727>.
- Tiwari, A., Hogan, T., O'Gorman, C., 2021. The good, the bad, and the ugly of 'Startup India'. *Econ. Political Wkly.* 56 (50), 45–52.
- Tucker, J., 2017. City-stories: narrative as diagnostic and strategic resource in ciudad Del Este, Paraguay. *Plan. Theory* 16 (1), 74–98. <https://doi.org/10.1177/1473095215598176>.
- Tucker, J.L., Anantharaman, M., 2020. Informal work and sustainable cities: from formalization to reparation. *One Earth* 3 (3), 290–329. <https://doi.org/10.1016/j.oneear.2020.08.012>.
- Vallas, S., Schor, J.B., 2020. What do platforms do? Understanding the gig economy. *Annu. Rev. Sociol.* 46 (1), 273–294. <https://doi.org/10.1146/annurev-soc-121919-054857>.
- Vignesh, J., 2016. How Startups Are Engaging Citizens to Make Cities Much Cleaner. *The Economic Times*, March 18, 2016. <https://economictimes.indiatimes.com/small-biz/startups/how-startups-are-engaging-citizens-to-make-cities-much-cleaner/articleshow/51449862.cms?from=mdr>.
- Viswanathan, M.D., Echambadi, R., Venugopal, S., Sridharan, S., 2014. Subsistence entrepreneurship, value creation, and community exchange systems: a social capital explanation. *J. Macromark.* 34 (2), 213–226. <https://doi.org/10.1177/0276146714521635>.
- Vitta, Shweta, 2016. How Chennai-Based Paperman Is Creating an Alternative Trash Economy Worth Rs 20,000 Cr. *YourStory.Com*, April 1, 2016. <https://yourstory.com/2016/04/paperman/amp>.
- von Vacano, M., 2021. Going Gojek, or Staying Ojek? Competing Visions of Work and Economy in Jakarta's Motorbike Taxi Industry. In: *Beyond the Wage: Ordinary Work in Diverse Economies*. Bristol University Press, Bristol, pp. 211–232.
- Wells, K.J., Attoh, K., Cullen, D., 2021. 'Just-in-Place' labor: driver organizing in the Uber workplace. *Environ. Plan. A: Econ. Space* 53 (2), 315–331. <https://doi.org/10.1177/0308518X20949266>.
- Wittmer, Josie, 2022. Dirty work in the clean city: an embodied urban political ecology of women informal recyclers' Work in the 'Clean City.' *Environ. Plan. E: Nat. Space*, May, 25148486221102376. [10.1177/25148486221102374](https://doi.org/10.1177/25148486221102374).