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Waste Work in the Global South: Exploring Activity Theory as a Framework for Understanding Distributed Roles of Intermediaries in Cape Town's Urban Waste Economy

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Abstract

Waste work in cities of the Global South is arranged with myriad actors, both formal and informal, who individually and collectively, and to varying capacities, play a distinctive yet interconnected role in the urban waste economy. These roles are interrelated and involve the management, movement and monetisation of recyclable waste. However, given the complexity of infrastructure(s), technology as well as urban socio-spatial stratification within contexts of the Global South, conventional frameworks that seek to explain waste work have limited capacity in delineating the varying role(s) of actors within a community of practice and how these roles are continuously changing through mutual interconnections and adaptation. This article explores Activity Theory as a framework for understanding how the role(s) of actors are continuously negotiated through mediating factors such as *(i)* technology/infrastructure; *(ii)* rules and regulations; *(iii)* community of actors and *(iv)* the division of labour. This article draws on an ethnographic case of intermediary waste workers within Cape Town's urban waste economy, and rather than focussing on the role of individual actor(s) as (an) isolated element(s), this article embeds their individual roles in relation to a composite network of actors. The results of this article demonstrate how the role(s) of actors doing waste work are non-linear and are continuously mediated through their relations with technology, infrastructure and their interconnections with other actors. Moreover, this article provides holistic insight into new forms of knowledge production through waste work in the Global South, collaboration among myriad actors and the development of common consciousness toward the transformation and valorisation of waste.

Keywords Waste work · Global South · Activity Theory · Infrastructure · Technology · Mediation

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Introduction and Background

Waste Work in Cape Town: Framing Infrastructure and Technologies of Cities in the Global South

The challenge of understanding the roles of actors that interact with both formal and informal sectors come into full view when attempting to understand waste work in cities of the global South. A common feature of cities in the global South is that they have a large reserve base of waste-pickers,[1] that harvest recyclable waste as a living and simultaneously positively impacted solid waste management (Moreno-Sanchez & Maldonado, 2006; Samson, 2010; Gunsilius et al., 2011; Ramusch & Lange, 2013; Jerie & Tevera, 2014; Wilson et al., 2017). Consequently, a recyclable waste value chain has developed where various actors have assumed roles given their socio-economic position as well as their proximity to infrastructure(s) and relative mobility. Thus, oriented toward Millington and Lawhon (2019:1044) argument that states that "[s]outhern waste geographies have largely focused on case studies of informality and (neoliberal) governance", this article aligns with focusing on the production of value and the role of materiality and technology in the wastescape as well as understanding that multi-scalar waste-scape contributes to insights into the distribution of costs and benefits as well as what constrains and enables extraction of value for different actors.

A brief sketch of waste-workers and their stratification in Cape Town can be delineated through their use of artefacts/tools as they manage, monetise and move recyclable waste. A preliminary framework is set out by Timm (2015) describes street waste-pickers as *(i)* 'skarelaars' who use a trolley or carts to move recycle waste in the urban; *(ii)* 'Carties' are a humanimal assemblage that describe actors that use a horse-cart and ride a horse to move recyclable waste; *(iii) bakkie* brigade that refer to actors that use *bakkies* (pick-up truck) to transport recyclable waste and because of their elevated position in the value chain, they play the role of intermediaries or middlemen. Millington and Lawhon (2019) have argued that these technologies must be examined in the context of global capital flows and governance processes, as this contributes to our understanding of the dynamics of global waste metabolisms. Additionally, they point out that "[w]aste materialities cut across the formal and informal, drawing attention to the interrelated dynamics of governing the surplus materialities of contemporary life" (Millington & Lawhon, 2019:1057). The focus of this article will be intermediary waste workers, or what is colloquially known in Cape Town as the *bakkie* brigade, that utilise a bakkie and have access to infrastructure and technology in Cape Town's wastescape. Operating within the fuzzy boundary between the formal and informal, an exploration of their roles elucidates the complexity of waste work in the global South and how these individual roles are mediated by technology and

[1] Waste-pickers go by many terms, like informal recycler, reclaimer, scavenger and salvager to name a few. I use the term waste-picker in this manuscript as it is the most common and referenced term that refers to this group of actors within the waste-scape.

infrastructure that connect actors organically and intimately to the context of the global South.

Intermediary Waste Workers and Their Role in Southern Cities: Toward Understanding Activity and Practice as Central to the Role of Actors

Intermediate waste workers, or the *bakkie* brigade, operate in the larger metropolitan area of Cape Town, a city riddled with inequality, poverty and like most countries in the global South, a large informal economy. Given the prevalent poverty and inequality, recycling waste has become an industry that waste-pickers have utilised as an income-generating activity, constituting the lowest layer of waste recycling in Cape Town. Intermediary actors, like the *bakkie* brigade, operate in the 'middle' or intermediate layer, where they are considered middlemen or intermediaries (Timm, 2015). Their position in the value is also influenced by their relative access to capital and infrastructure such as buy-back centres and technologies such as a *bakkie* (pick-up truck) and baling machines. Their role in adding value to waste and the modalities of their operations are complex and often hidden behind the black-box of the formal-informal framing. Like middlemen or intermediaries in the world of waste work, their roles are often dismissed as being exploitative to waste-pickers at the lower ends of the value chain (Medina, 2000; Medina, 2005; Luubale & Nyang'oro, 2013; Nzeadibe & Iwuoha, 2008). Nevertheless, there is burgeoning literature making use of urban waste metabolisms methodologies that have highlighted the unrecognised role of intermediaries, which is comprised of heterogeneous waste handlers and their impact within multi-scalar and changing structures of waste flows. As Guibrunet et al. (2017:365) highlight:

> Documenting the experiences of different levels of intermediation is a means to reveal the complex stages of waste management and the risks they pose to the people who manage such stages, something which is hardly acknowledged in formal waste management systems.

In line with acknowledging the role of intermediaries or middlemen, Tuori (2009) observes in the case of Bandung, Indonesia, that the 'middlemen industry' has a great deal of heterogeneity in terms of earnings and vulnerability. He also shows that the middlemen industry adds value to the supply chain by providing capital and transportation to waste reclaimers at the lower end of the value chain. Tuori (2009:76) asserts:

> By providing transportation and storage of materials, middlemen contribute to the efficiency of the supply chain by supporting a reverse distribution system that, through a decentralized network of middlemen, can aggregate materials from a large number of dispersed locations to a few centralized facilities. This process requires a great deal of trust among players on both sides, and middlemen bear some of the risk associated with dealing with both factories and waste pickers.

The heterogeneity and complex distribution of intermediary workers are often offset by abstractions and generalizations like the lens of the formal-informal dichotomy; however, I propose that a solution is offered by activity theory which frames an understanding that the actions of actors are always situated in a context (Kuutti, 1995). Because context is included within the unit of analysis of activity theory, the object of research is always essentially collective even if the main interest is in the individual actions. An individual can and usually does participate in several activities simultaneously (Kuutti, 1995). Thus, central to the argument of understanding intermediary roles is that their activities are not static or rigid entities, rather, their activities are continually changing and developing. This development of activities is not linear or straightforward, but uneven and discontinuous. The development of activities is taking place at all levels; new operations are formed from previous actions as participants' skills increase; correspondingly, at the level of actions the scope of new actions are enlarging, and totally new actions are being invented, experimented with, and adapted as responses to new situations or possibilities encountered in the process of transforming the object; finally the level of activity the object/motive itself is reflected, questioned and perhaps adapted, reacting to larger changes and other activities (Kuutti, 1995). In Activity Theory, the relationship between the subject (human doer) and object (the thing being done) forms the core of the activity. Thus, I argue that the drawing from Activity Theory assists in opening up the black box of complexity and nuance that define the roles of waste workers generally and intermediary waste workers in particular. This orientation provides a framework for appreciating myriad forms of how actors relate to a dynamic and emergent city through that is both transforms and is transformed by actors' everyday entanglements with infrastructure, technologies and Southern contexts.

This article will be framed in three sections; the first section will provide a historical background and theoretical development of Activity Theory as well as its variants that speak directly to the process of the transformation and valorisation of the 'object'. The second section will explore a case of two intermediary actors in Cape Town, or colloquially known as the 'bakkie brigade', and will ethnographically explore the day-to-day activities of waste work within an intermediate level of the waste value-chain. The third section will demonstrate how Activity Theory enhances an understanding how the role(s) of intermediary actors are continuously negotiated through mediating factors such as *(i)* technology/infrastructure; *(ii)* rules and regulations; *(iii)* community of actors and *(iv)* the division of labour. Finally, the article ends with a reflection on how Activity Theory can enhance our understanding of new forms of knowledge production through waste work in cities of the Global South, collaboration among myriad actors and the development of common consciousness toward the transformation and valorisation of waste.

Activity Theory: History, Practice and Variants

Philosophical Roots and Development of Activity Theory

Activity theory has its three-fold historical origins in classical German philosophy (from Kant to Hegel), in the writings of Marx and Engels, and in the Soviet Russian

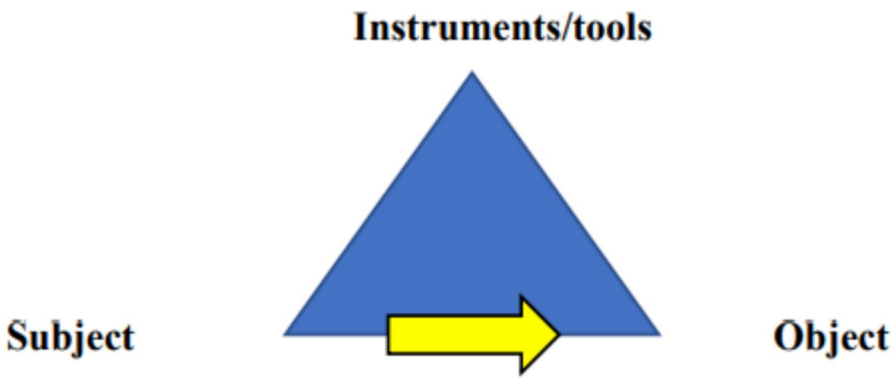

Fig. 1 Level 1 Activity Theory (adaptation from Engeström et al., (1999))

psychology of Vygotsky, Leont'ev and Luria (Engeström et al., 1999). The fundamental relation, in Activity Theory, between subject and object comes from Marx's philosophical thought in describing the general characteristics of labour which he depicts as human activity that changes nature. In Marx's framework, human activity uses features of one natural object as tools for acting on other objects, thus turning the former into an organ of activity. Thereby, human activity exerts its influence on nature, and consequently human beings change their own nature at the same time. From these foundations it was Vygotsky, a Soviet Marxist psychologist, developed the first generation of activity theory (Roth & Lee, 2007). Leont'ev and Luria developed Activity Theory further by incorporating the societal, cultural and historical dimensions into an explication of human mental functioning, leading to what constitutes the second-generation of activity theory. However, since the end of the Cold War, Activity Theory has been popularized and positioned as a global multidisciplinary research approach that has seen developments and applications within pedagogy (Hardman, 2008; Roth & Lee, 2007), work (Engeström et al., 1999) and technologies (Nardi, 1996).

The Fundamentals of Activity Theory

Activity Theory is a theoretical framework for the analysis and understanding of human interaction with objects through their use of tools and artefacts (Hashim & Jones, 2007). Activity theory assists in gaining a better understanding of 'who is doing what, when and how' (Hasan & Kazlauskas, 2014). Activity Theory's utility comes from highlighting both individual actions and social/collective transformation (Engeström et al., 1999 cited in Jones, 2009) of the object. In Activity Theory, the relationship between the subject (human doer) and object (the thing being done) forms the core of the activity (See Fig. 1 below).

The object of an activity encompasses the activity's focus and purpose while the subject, a person or group engaged in the activity, incorporates the subject's or subjects' various motives (Haasan & Kazlauskas, 2014). Activity Theory sees the

integration of technology as tools which mediate social action. Activity Theory uses the whole work activity as the unit of analysis, where the activity is broken into the analytical components of subject, tool and object, where the subject is the person being studied, the object is the thing being worked on, and the tool/instrument is the mediating device by which the action is executed (Hashim & Jones, 2007). Engeström's modification of Lev Vygotsky's original theory provides for two additional units of analysis, which have an implicit effect on work activities. The first is rules or sets of conditions that help to determine how and why individuals might act and are a result of social conditioning. The second is division of labour, which provides for the distribution of actions and operations among a community of workers. These two elements affect a new plane of reality known as community, and, through this, groups of activities and teams of workers are anchored and can be analysed (Hashim & Jones, 2007).

The difference between Level 1 and Level 2 Activity Theory lies in that Level 1 does not fully explicate the societal and collaborative nature of individual actions, or, in other words, it does not depict individual actions as events within a collective activity system (Engeström et al., 1999). The utility in this framing lies in the idea of 'radical localism' which posits that the fundamental societal relations and contradictions of the given socio-economic formation – and thus the potential for qualitative change – are present in each and every local activity of that society. In this sense, Engeström et al., (1999) argues that it might be useful to look at society more as a multi-layered network of interconnected activity systems and less as a pyramid of rigid structures dependent on a single centre of power.

Ideological Tensions Within Activity Theory: is Waste Work Generalised Activity or Part of Capitalist Valorisation?

Although Engeström et al., (1999) acknowledges the Marxian underpinnings of Activity Theory, there is a group of scholars who argue that this strand of Activity Theory is losing touch with its Marxian roots (see, for example, Avis, 2007; Jones, 2009, 2011). Jones (2009) argues that Engeström departs significantly from Marx's conception of human activity and that the dominant strand of Activity Theory has conflated the labour process (human activity) with the valorisation process (process of adding value), which is a distinction that is fundamental to Marx's theoretical and political perspective of activity under capitalist production (Jones, 2009).

The difference between Engeström's Activity Theory and Activity Theory that stays true to Marx's method is at the level of the unit of analysis. Activity Theory defines its unit of analysis "in the concept of object-oriented, collective, and culturally mediated human activity, or activity system" (Engeström et al., 1999:9) which can include an analysis of any local activity or activity system. Jones (2011) takes issue with how Engeström frames the unit of analysis of Activity Theory, which is posited as a broad and abstract local activity or activity system. This would mean that any activity can be taken as a unit of analysis, thereby treating every activity as having equal significance. The problem that arises from

Engeström's use of the local activity system as a starting point for analysis is that it tends to equalise all forms of activity into an activity system model that cannot tell us the types of activities that are specific to capitalist production. Jones (2011) shows how Marx argued that a historically specific social formation like the capitalist mode of production could not be properly understood by approaching it armed with general concepts and notions (i.e., abstract local activity or activity system) that can be applied to any and all social formations throughout history, whatever similarities or commonalities they might appear to have. Instead, drawing from Marx's method, Jones (2011) posits that we should begin with the specific economic object that distinguishes capitalist production from other social formations. From this simplest economic object (cell form), Marx systematically uncovered the logic of development of the whole economic structure of capitalism (organism). As Jones states:

> Marx's method does not involve reducing each and every activity in society to the same "model" but in understanding how these activities are related on the basis of capitalist production (2011:201).

This means that, in order to understand an activity under capitalist production, Activity Theory should have the transformation of an object as its unit of analysis, because capitalist production involves the transformation of objects into commodities, such as through the valorisation process. Moreover, Jones (2011) points out that while capitalist production involves making commodities, commodity production does not make capitalism. The main contradiction or relationship that distinguishes capitalist production from all other modes of production, in Marx's view, is that between wage labour (i.e., the agents of productive activity) and capital (i.e., those who extract surplus value from these agents) (Jones, 2011:203). Therefore, to adequately link an activity system to the broader capitalist social relations, Jones (2016) makes a distinction between the labour process and the valorisation process. The labour process is an activity that may take place in any given situation, while the valorisation process (the creation of value attached to a commodity) refers to the process that links an activity to capitalist social relations. Marx described the simple elements of the labour process as:

(i) Purposeful activity, that is, work itself.
(ii) The object on which that work is performed.
(iii) The instruments utilised in that work.

This is clearly seen within Level 1 of Activity Theory (see Fig. 2), where the activity of an individual is mediated by an instrument. However, although this simple labour process is universal and can apply to any form of activity humans engage in and exists in every mode of production (for instance, slavery, feudalism, capitalism), Jones (2016) argues that these simple features do not pertain to specific features of work activity under capitalist production at all. The process that distinguishes capitalist production is the process of valorisation, which is the production of value attached to commodities. According to Jones, "[h]uman activity is clearly there within the process of capitalist production, but it is subordinated to,

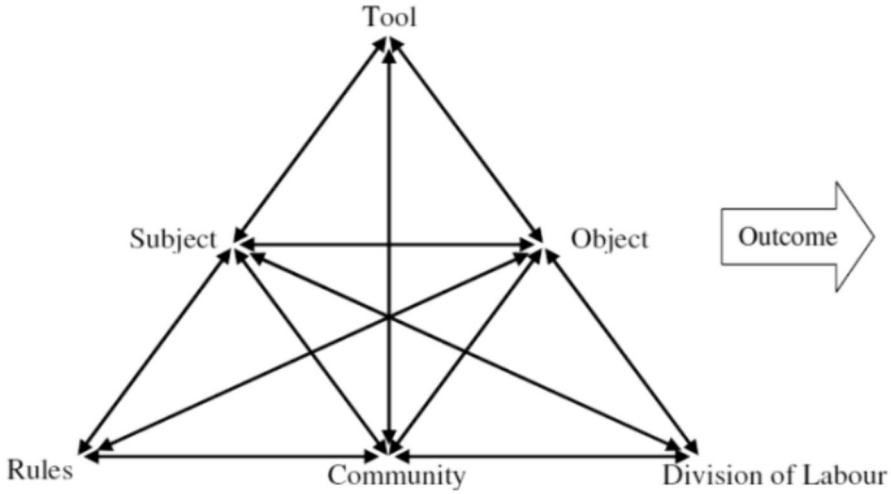

Fig. 2 Level 2 Activity Theory (adaptation from Engeström et al., (1999))

appropriated, subjugated and exploited by the 'activity' of valorization" (2016:5). Human activities have become increasingly entangled in the capitalist valorisation process. Therefore, by conflating the labour process (human activity) and the process of valorisation (creation of value) we lose touch with a larger process of capitalist production, exploitation and subjugation. Jones (2011) states the following: 'By this procedure the labour process is immediately robbed of its revolutionary character and implications and the forms of 'activity' under capitalist society are naturalized' (208).

However, for the purposes of understanding waste work in the global South, I find drawing from the framework that Engestrom et al., (1999), while also acknowledging Jones (2009) critique and emphasis on the valorisation process, provides insight into the non-linear and interrelated roles of waste workers generally in the global South and intermediaries specifically in Cape Town. The significance of Activity Theory stems from the analysis of the individual, in pursuance of their activity and objective through an examination of their tools and its mediation through rules, community and history (Hashim & Jones, 2007).

Situating Activity Theory and Waste Work in the Global South

Activity theory is a contextual theory that describes human actions as parts of purposeful activities of a collective nature that involve learning (Nikolaidou & Bellander, 2018). Posited in the context of waste work in the global South, I argue that this framework can provide insight into the distributed nature of the roles of waste workers along the recyclable waste value chain. This framework is suggested in contrast to using conventional frameworks that describe features of the global South, such as the dichotomy between the formal and informal economy, that attempts to describe and contrast the marginality of actors and the unequal

distribution of resources. Contestations on what activities are considered informal still presents fresh debates (Chen & Carré, 2020). Moreover, House (1984) argues that the simple dichotomy between the formal and informal sector is inadequate, as he observes the diversity and dynamism of the informal sector grapples with whether workers in the informal sector should be framed as either 'dynamic entrepreneurs' or 'surplus populations', as he observes both enterprising individuals that generate reasonable incomes for themselves and, in stark contrast, other individuals that are forced by their circumstance to eke out a meagre subsistence lower down on the informal spectrum (House, 1984). House (1984), like Breman (1976), is critical of the use of the concept 'informal sector' and argues that any attempt to demarcate the informal sector will give rise to inconsistencies and difficulties. It is in this manner that the dualistic nature of the formal/informal framing inadequately allows for an understanding of the interconnected nature of waste work in the Global South as well as the latent actions and everyday negotiations of actors that destabilise the duality between formal and informal.

Although Activity theory posits itself as a meta-theory, its utility lies in the fact that Activity Theory bridges the gap between the individual actor(s) and concrete social reality – it studies both through mediating activity. Thus, the unit of analysis of Activity Theory is the concept of object-oriented, collective and culturally mediated human activity, or activity system. Moreover, rather than situating actors within a defined set of abstract criteria (i.e., formal/informal dichotomy). Activity Theory focusses on practice and orients an understanding of everyday practices in the real world as the central objective to understanding consciousness (Nardi, 1996). Activity theorists argue that the object of Activity Theory is to understand the unity of consciousness and activity among actors. Activity theory thus incorporates strong notions of intentionality, history, mediation, collaboration and development in constructing consciousness. In Activity Theory, consciousness is located in everyday practice; you are what you do (Nardi, 1996). And what a person does is embedded in the social matrix of which every person is an organic part. The social matrix is made up of people and artefacts and understanding the interpretation of the individual, other people, and artefacts in everyday activity is the challenge of activity theory itself (Nardi, 1996).

Methods and Study Area

Ethnographic research locates itself within the context of natural learning environments (Collins et al., 2004). Also known as the art and science of describing a group or culture (Fetterman, 1982), ethnographic research provides rich descriptions that make it possible to understand what is happening and why. The characteristics of ethnographic research include participant and non-participant observation, the focus on natural settings, the use of participants' constructs to structure research (LeCompte & Goetz, 1982). Ethnography's strength lies in description (Fetterman,

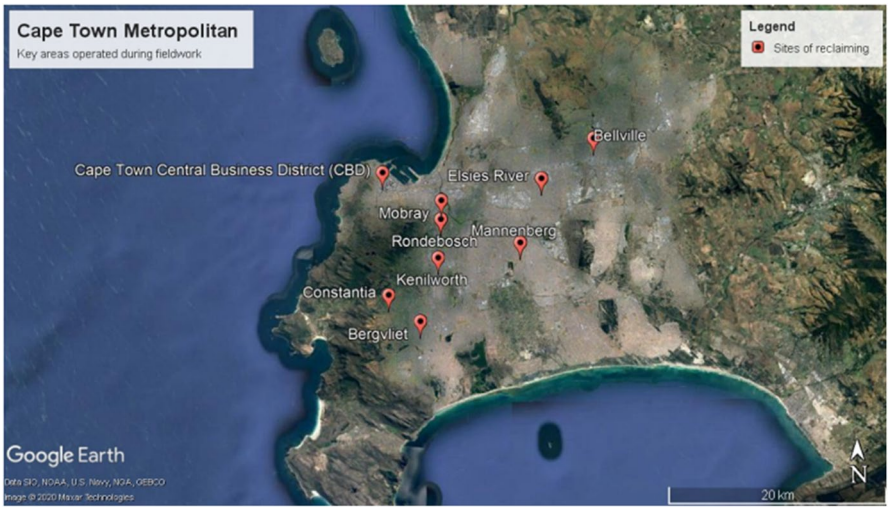

Fig. 3 Map of Cape Town Metropolitan depicting key sites of fieldwork (Image data ©2020 Maxar Technologies)

1982) and the immersion of the ethnographer in a culture in order to observe and record people's behaviour in their natural setting.[2]

In co-constructing meaning alongside intermediary waste workers, we utilised an unstructured interview method, which, as Given states, 'can be particularly useful for ethnographic research' (2008:907). Given continues:

> Living among a group of individuals, learning their culture and perspectives lends itself naturally to having conversations with participants more so than asking them a set of prescribed questions (2008:907).

We made particular use of the mobile ethnographic method defined as '"walking with", or travelling with people, as a form of sustained engagement within their worldview' (Urry, 2007:40). It is otherwise defined as 'mobile participant-observation with a particular focus on mobile phenomena' (Novoa, 2015). The bakkie brigade operate with bakkies (pick-up trucks) and move within the urban, making mobility central to their operation of waste collection. We therefore 'shadowed' (Novoa, 2015) the research participants on their daily routines and participated in the activities of reclaiming. We found inspiration in the growing body of waste mobilities literature and methodologies that stress the usefulness of 'following the thing' (Swanton, 2014) and that expose the global flows of commodities (Gregson

[2] Ethical clearance for this study was granted on 4 September 2019, for the period of two (2) years by the Humanities and Social Science Research Ethics Committee of the University of the Western Cape who approved the methodology and ethics of the project named: 'The bakkie brigade in Cape Town's urban waste economy: exploring waste mobilities and the precariat'. The ethics reference number is: HS19/7/9. Verbal consent as well as an option for written consent (which was refused from the research participants) was obtained.

et al., 2010) through attending to waste, their materialities, where they go and how they evolve (Davies, 2012).

I[3] spent my time travelling with two research participants (pseudonyms 'Eddie' and 'Christopher' are given to two respective research participants) throughout the broader metropolitan area of Cape Town. Some key areas where we operated include Mannenberg, Bellville, Kenilworth, Constantia, Bergvliet, Elsies River, Mobray, Pinelands, Rondebosch and the Central Business District (CBD) of Cape Town, as highlighted on the map below (Fig. 3):

It is important to note that the engagement with participants through informal conversations and walking ethnography provided valuable insights into the world of participants. Within the context of Cape Town, language dynamics played a key role in shaping conversations between individuals in ethnographic research. The use of Afrikaans terms like *bakkie* as well as the common understanding of the Afrikaans language enhanced the results emanating from the data collection process.

Situating Intermediary Waste Workers Within an Activity System

Activity and Knowledge Production Among Waste Workers

A central tenet to Activity Theory is the notion of the motive force (see Hashim & Jones, 2007; Jones, 2009). Hashim and Jones (2007) explain that motive force refers to the activities that are directed toward an object. Millington and Lawhon bring this into context within the waste-scape when they note, 'as waste gains value, actors are more incentivised to get it' (2019:1055). However, we were more concerned with what creates this motive force. Is it the materiality and force of waste as an object? Do waste workers (as a subject) themselves produce value as 'something akin to alchemy' (Samson, 2009:14)? Or is it that the activities of waste workers that are embedded in a social system of valorisation? Part of our argument is for the latter.

Waste workers are compelled to capture and transform waste into commodities. Synthesising the subject-oriented perspectives which have been explored by Samson (2009) and object-oriented perspectives that focus on waste's materiality (Davies, 2012; Swanton, 2014) would allow for a much more instructive understanding of waste's movement, management, valorisation and transformation within a broader capitalist system. The value latent in recyclable waste that compels the mobilities of reclaimers is productively understood through David Harvey's explanation of value as an "immaterial, but objective force" (Harvey, 2017:5). The value latent in recyclable waste is not tangible, yet it has material and concrete consequences among waste workers. Waste workers are compelled to valorise the embedded value in waste through their labour, however, this only happens because there is a market for specific types of recyclable waste. This represents the markets' influence that mediates reclaimers activities in the waste-scape.

[3] The first author of this manuscript collected the data and acted as fieldworker for this project. In the following empirical section(s), the pronoun 'I' is used to refer to the first author.

According to Activity Theory, it is the subject (waste worker) and object (recyclable waste/commodities) that form the core of the activity. The subject and object have a dialectical relationship and it is therefore the mediation of technological capacities and capabilities of the actors that coincides with the demand of recyclable waste that determines the production of value (activity) in the waste-scape and in turn the activities of waste work. Synthesising the subject and the object by considering the varied set of technologies and infrastructure (Lawhon et al., 2018; Millington & Lawhon, 2019) opens up thinking about the modalities of knowledge and value produced through the way activities is enacted and performed. Ilyenkov (2007) posits that the starting point of knowledge is real action with an object. This critical encounter of knowledge production occurred to us while operating in Cape Town's CBD with Christopher and comes from our reflections on during fieldwork:

> There was one significant stop we made at a block of flats within the CBD of Cape Town. Christopher has an agreement with one of the domestic workers that works at the block of flats. Christopher requires the recycled materials sorted from the waste so that he does not waste time when he arrives at the pick-up point. We arrived today at the block of flats and the 'waste' was not correctly sorted from the recycled material. Christopher was frustrated because we had to waste time sorting through the waste ourselves, which costed him time. There was lots of glass bottles, cardboard, PET plastics and cartons. I was also involved in sorting the material at the time because I had gloves, I could wear. As I was sorting through cartons and cardboard, I was also packing in pulp fibred egg trays, confusing this for cardboard. Christopher told me to take the pulp fibred egg trays out from the recyclable material because the pulp fibred egg trays were 'waste'… This was the moment I realised that I was not dealing with 'waste' that we were collecting; instead, these were commodities that we were mobilising and moving through the urban setting.
> Vignette 1: 15 November 2019, operating in Cape Town's CBD

While operating with Christopher, knowledge appears to me precisely as knowledge of the thing (commodity) and not as a special structure situated outside the thing (waste). This process of reclamation negated wastes' identity, transcending it to a commodity and thereby also confirming the identity of the waste worker. The subject in this case encounters the object and from that very moment merges with the object (subject-object) through its activity. Christopher (subject) learnt of waste as a commodity through engagement with industry standards (rules and regulations) as well as knowledge exchange from his network of intermediaries (community of actors). Through this interaction, a person emerges as a subject of action with the object, as personified knowledge, as knowledge that has direct mutual relation with things, as knowledge of things (Ilyenkov, 2007). Theorising in this way provides an avenue for thinking about the production of waste work more generally. An activity is the result of a dialectic between the subjectivities and capabilities of actors (subject) and the interaction with an object (which is waste/commodity).

Complexities of the Bakkie Brigade and Intermediary Roles in Cape Town's Waste-Scape

Theorising mobilities at different scales has been highlighted by Sheller (2013) as overcoming the limitations of the micro versus macro imagination of agency and structure that goes beyond a micro-sociology of practice. This is incredibly instructive in theorising the more complex relations of power, control and resistance that are contingent on a heterogenous set of mediating tools distributed unevenly in the wastescape and which shapes the differential scales of activities. A key conversation that took place in Eddie and Christopher's office unearthed complex meanings from the intermediary waste worker subjectivities:

> A conversation on the value chain started when I asked Eddie about the bakkie brigade and whether he was part of the bakkie brigade. Eddie had heard about the notion 'bakkie brigade' before. However, he did not associate himself with the concept. He said that the bakkie brigade are buy-back centres found in the township. I was confused at this point, and asked whether these buy-back centres have bakkies of their own. Eddie replied and said that some of them do have bakkies while others do not. I asked in confusion, 'What are you guys, then?' Christopher interjected and said that they are a 'value-adding buy-back centre' and that the main difference between the so-called bakkie brigade (township buy-back centres) and their small business is that they (Christopher and Eddie) add value to waste so that processing companies can accept it. Eddie jumped in the conversation again and said that I could think of them as a 'glorified bakkie brigade'. I suppose this implied an elevated status or a higher rank/position in the value chain.
> Vignette 2: 13 November 2019, reflections during lunchtime with Eddie and Christopher

From this conversation I came to realise how Eddie and Christopher position themselves in relation to the notion 'bakkie brigade'. The impulse of their positionality immediately elevated their status to a rank above the so-called bakkie brigade, implicitly flexing their capital and value-adding capabilities. Strikingly, Christopher's assertion stands out for me when he proposed that I could think of them as a 'value-adding buy-back centre', providing a hint of their role and function in the waste value chain.

This is strongly indicative of a complex hierarchy and power relations in the waste value chain. Eddie and Christopher's 'superior' positioning relegated what they thought was the bakkie brigade (township buy-back centres) to a seemingly 'lower' class representing ordinary actors in the waste-scape that have do not have access to these value-adding capabilities. From this interaction, Christopher drew a flow diagram to show their position in the division of labour in their community of practice (Fig. 4):

From this diagram we can see clear degrees of scalar and power relationships within Eddie and Christopher's network. The stratification of this network is contingent on the scale that waste workers operate and how 'mobile' they are (whether or not they have a *bakkie*). The process starts from the top of the diagram

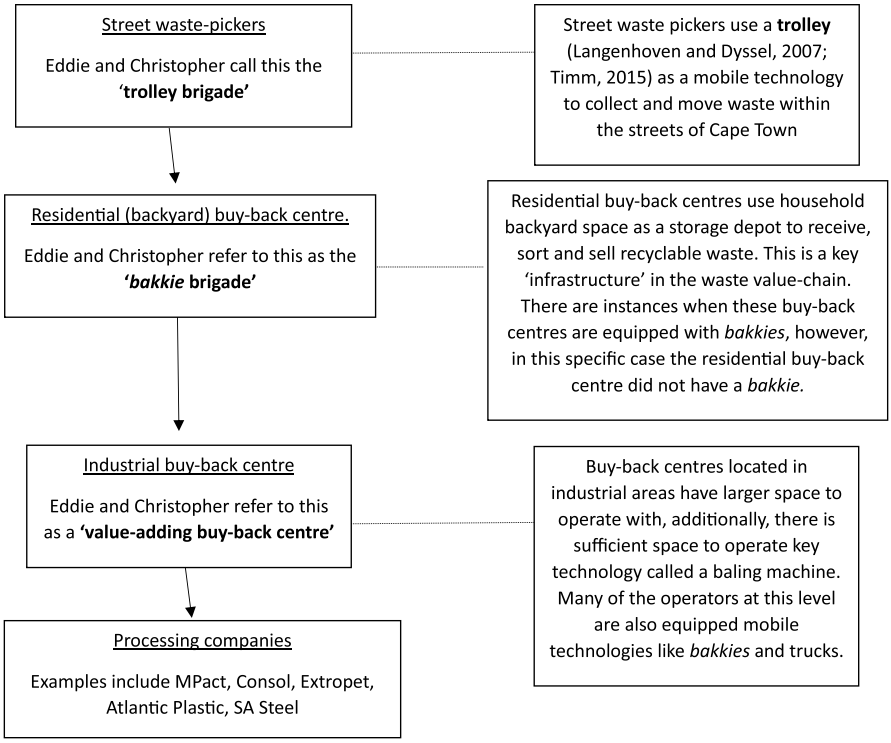

Fig. 4 Adaptation of flow diagram depicting the informal urban waste economy hierarchy

with the "trolley brigade" that are equipped with a trolley that has less capacity compared to the bakkie that can hold about 2 tonnes of recyclable waste. The trolley brigade transports waste to what Christopher understands as the "*bakkie* brigade" or how he termed it "*bakkie* guys" which are actually township buy-back centres. I found it perplexing as to why Eddie and Christopher would refer to a township buy-back centre as the 'bakkie brigade' when they explained that township buy-back centres may or may not have *bakkies* of their own. The township buy-back centre that Eddie and Christopher services does not have *bakkies* of their own. It is these township buy-back centres that rely on intermediaries like Eddie and Christopher to collect and transport recyclable waste from the township and deliver it either to processing companies or it will be transported to Eddie and Christopher's buy-back centre – depending on the type of recyclable waste. Eddie and Christopher's buy-back centre is referred to as a "value-adding buy-back centre", and they are positioned higher along the waste value chain, not only because they have bakkies, but also because they have a larger depot (buy-back centre) and, more importantly, they are equipped with a baling machine. Eddie and Christopher's buy-back centre, at the time of research, was situated in an industrial area which provided the operational space to utilize a baling machine. Baling machines add value through bulking recyclable waste, especially that of PET plastic bottles so that processing companies

can accept it. The recyclable waste is then moved toward processing companies and finally exported or sold locally for manufacturing.

> Today I arrived on site quite early, entering the premises where Eddie operates at about 07:30. Eddie was already in his office counting and evaluating the receipts from his clients. He was dealing with a backlog; he is falling behind with regard to his administrative duties. He is still busy with receipts he received from September. After some reflection on the distinctions that were puzzling me regarding buy-back centre, bakkie brigade and the operation Eddie was involved in, I decided to ask Eddie what the differences were. He began by explaining that he does baling of PET plastics because he has a baler on site. This allows himself and other operators (with bakkies) to bring their recyclable plastics to him and drop it off on Eddie's site to be baled. These operators will be paid by Eddie for the recycled material that is dropped off. These other bakkie operators do not have their own baling equipment, although they do have bakkies, and therefore sell their recyclable material to Eddie. Eddie will then bale the recyclable material and sell it to the processing companies at a higher price. Baled recyclable plastics are valued at a higher price, and this places Eddie higher within the waste value chain as he provides a value-adding service through baling. After this explanation, the notion of the bakkie brigade became blurrier to me. However, there are interlinkages in the notions bakkie brigade, buy-back centre and Eddie's SME.
> Vignette 3: 11 November 2019, reflections at the industrial depot, on our way to purchase baling wires.

My confusion at the time of penning down this reflection stemmed from not grasping the different scales of the bakkie brigade (intermediaries and middlemen) in the waste-scape. The degrees of scale of operating among the bakkie brigade operators as well as the broader set of middlemen and intermediaries in the waste-scape have been explained in dualisms. For example, Tuori has explained that smaller middlemen tend to depend more on waste pickers as their primary source of income, while larger middlemen tend to buy more from other, smaller middlemen (Tuori, 2009). This is in line with Nzeadibe and Iwuoha's (2008) framing of the urban waste economy of Lagos, where they also contrast middlemen (small buyers) with large buyers (dealers/brokers). Timm (2015) follows a similar dichotomy when she distinguishes between 'big guys' (large recycling companies) and 'small guys' (bakkie brigade operators) in Cape Town's urban waste economy. Timm's (2015:181) findings suggests that the big guys often muscle out smaller guys, making it harder for the '*bakkie* brigade' operators to effectively operate. The notion 'small guys' also came through during my own fieldwork:

> Christopher said that the attempt at a partnership failed because there was no trust among the members. Some operators thought that they were being played or taken advantage of or they felt like the other members were getting more out of the partnership than them. Christopher blamed what he called the 'small-guy mentality', and Christopher says it is usually the newcomers in the

industry that have this attitude. Christopher says that the recycling industry is incorrectly marketed to newcomers.
Vignette 4: 13 November 2019, trip to Consol glass

Eddie and Christopher form part of a community of intermediaries or the so called *bakkie* brigade operators. These operators operate a range of buy-back centres in Cape Town's waste-scape that all have different degrees of capabilities. The dualistic interpretations within previous studies that attempted to explain the middlemen and intermediaries in the waste-scape have overlooked the diverse spread and heterogeneity of mediating technologies and infrastructures among actors which are crucial to understanding the heterogeneity of actors within the waste-scape. Considering the mediating tools among the diverse sets of actors that play the role of middlemen and intermediaries overcomes these dualistic interpretations and opens up an appreciably more nuanced understanding of the distribution of interrelated roles across multiple scales. Lawhon et al. (2018) describe the complex arrangement of material infrastructures that goes beyond individual artefacts and performative discourses by introducing the concept 'heterogeneous infrastructure configurations', which is an instructive framework within which to understand the spectrum of mediating tool/instruments. Understanding infrastructures from Lawhon et al. (2018) perspective provides a wider scope of how we can understand the activities of waste workers operating at this scale, who have a variety of varied mediating instruments and operate from range of buy-back centres. Understanding the heterogeneity of technologies and infrastructures in the waste-scape and their mediation of activities produces a more relational understanding of the role of the intermediary actors and their interrelation to other actors within the community of practice of waste work in Cape Town.

Conclusion

This article sought to explore the complex and interrelated roles intermediary waste workers in Cape Town through the lens of Activity Theory. This article demonstrated how the role(s) of intermediary waste workers are not static or rigid entities, rather, their activities are continually changing and developing. This development of activities is not linear or straightforward, but uneven and discontinuous – dependent on the mediation of technology and infrastructure as well as their interrelation to actors within their community of practice. The development of activities among intermediary waste workers takes place at all levels, affirming Engeström's et al., (1999) statement that it might be useful to look at society, or in this case the waste-scape, more as a multi-layered network of interconnected activity systems and less as a pyramid of rigid structures dependent on a single centre of power or emphasis on individual role without the collective context. Moreover, Jones (2009) addition to Activity Theory provides us with an appreciation for understanding the process of valorisation embedded within the activities of intermediary waste workers. The results of this article demonstrate how the role(s) of intermediary actors doing waste work are non-linear and are continuously mediated through their relations with

technology, infrastructure and interactions with other actors. Moreover, this article provides a conduit for novel insight into forms of knowledge production through waste work within the context of Southern cities, collaboration among myriad waste workers and the development of common consciousness toward the transformation and valorisation of waste.

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Data Availability The data that support the findings of this study are available on request from the corresponding author, JM Goeiman. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

Declarations

Human Participants This work has been ethics approved by the OFFICE OF THE DIRECTOR: RESEARCH AND INNOVATION DIVISION of the University of the Western Cape. The ethics approval has an Ethics Reference Number of HS19/7/9. Informed consent has been obtained from the research participants in this study.

Competing Interests The second author, B Rink, at the time of publication, was a Co-Editor-in-Chief forUrban Forum and was not involved in the editorial review or the decision to publish this article.

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References

Avis. (2007). Engeström's version of activity theory: A conservative praxis? *Journal of Education and Work, 20*(3), 161–177. https://doi.org/10.1080/13639080701464459

Breman, J. (1976). A dualistic labour system? A critique of the "informal sector" concept: III: Labour force and class formation. *Economic and Political Weekly*, *11*(50), 1939–1944. http://www.jstor.org/stable/4365172

Chen, M., & Carré, F. (2020). *The informal economy revisited*. Routledge. ISBN 9780367513894.

Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *Journal of the Learning Sciences, 13*(1), 15–42. https://doi.org/10.1207/s15327809jls1301_2

Davies, A. R. (2012). Geography and the matter of waste mobilities. *Transactions of the Institute of British Geographers*, *37*(2), 191–196. http://www.jstor.org/stable/41427940

Engeström, Y., Miettinen, R., & Punamäki-Gitai, R.-L. (1999). *Perspectives on activity theory*. Cambridge University Press.

Fetterman, D. M. (1982). Ethnography in educational research: The dynamics of diffusion. *Educational Researcher, 11*(3), 17–29.

Given, L. (Ed.). (2008). *The SAGE encyclopedia of qualitative research methods, Volume 1 and 2*. Sage.

Gregson, N., Crang, M., Ahamed, F., Ahkter, M., & Ferdous, R. (2010). Following things of rubbish value: End-of-life ships, "Chock-chocky" furniture and the Bangladeshi middle class consumer. *Geoforum, 41*, 846–854.

Guibrunet, L., Calvet, M., & Broto, V. (2017). Flows, system boundaries and the politics of urban metabolism: Waste management in Mexico City and Santiago de Chile. *Geoforum, 85*, 353–367.

Gunsilius, E., Spies, S., & García-Cortés, S. (2011). *Recovering resources, creating opportunities: Integrating the informal sector into solid waste management*. Deutsche Gesellschaft für Internationale Zusammenarbeit.

Hardman, J. (2008). Researching pedagogy: An activity theory approach. *Journal of Education, 45*(1), 65–95.

Harvey, D. (2017). *Marx, capital and the madness of economic reason*. Profile Books LTD.

Hasan, H., & Kazlauskas, A. (2014). Activity theory: Who is doing what, why and how. In H. Hasan (Ed.), *Being practical with theory: A window into business research* (pp. 9–14). THEORI.

Hashim, N., & Jones, M. (2007). Activity theory: A framework for qualitative analysis. *4th International Qualitative Research Convention (QRC),* Malaysia, 3–5 September.

House, W. (1984). Nairobi's informal sector: Dynamic entrepreneurs or surplus labor? *Economic Development and Cultural Change, 32*(2), 277–302.

Ilyenkov, E. (2007). A contribution on the question of the concept of "Activity" and its significance for pedagogy. *Journal of Russian & East European Psychology, 45*(4), 69–74. International Lab.

Jerie, S., & Tevera, D. (2014). Solid waste management practices in the informal sector of Gweru, Zimbabwe. *Journal of Waste Management, 2014*, 1–7.

Jones, P. (2009). Breaking away from capital? Theorising activity in the shadow of Marx. Outlines. *Critical Practice Studies*, *11*(1), 45–58. Available at: https://tidsskrift.dk/outlines/article/view/2255. Accessed: 27 November 2020.

Jones, P. (2011). Activity, activity theory, and the Marxian legacy. In P. E. Jones (Ed.), *Marxism and education* (pp. 193–213). Palgrave Macmillan.

Jones, P. (2016). "Activity Theory" Meets Austerity - or does it? The challenge of relevance in a world of violent contradiction and crisis. *Theory and Struggle, 117*, 93–99.

Kuutti. (1995). Activity Theory as a potential framework for human-computer interaction research. Published in B. Nardi (Ed.), *Context and consciousness: Activity theory and human computer interaction* (1995, pp. 17–44). MIT Press.

Lawhon, M., Millington, N., & Stokes, K. (2018). A labour question for the 21st century: Perpetuating the work ethic in the absence of jobs in South Africa's waste sector. *Journal of Southern African Studies, 44*(6), 1115–1131.

LeCompte, M., & Goetz, J. P. (1982). Problems of reliability and validity in ethnographic research. *Review of Educational Research, 52*(1), 31–60.

Luubale, G. N., & Nyang'oro, O. (2013). *Informal economy monitoring study: Waste pickers in Nakuru, Kenya*. WIEGO.

Medina, M. (2005). Waste picker cooperatives in developing countries. *WIEGO/Cornell/SEWA Conference on Membership-Based Organizations of the Poor*, Ahmedabad. Available at: https://www.wiego.org/sites/default/files/publications/files/Medina-wastepickers.pdf. Accessed: 27 November 2020.

Medina, M. (2000). Scavenger cooperatives in Asia and Latin America. *Resources Conservation and Recycling, 31*(1), 51–69.

Millington, N., & Lawhon, M. (2019). Geographies of waste: Conceptual vectors from the global south. *Progress in Human Geography, 43*(6), 1044–1063.

Moreno-Sanchez, R., & Maldonado, J. (2006). Surviving from garbage: The role of informal waste pickers in a dynamic model of solid-waste management in developing countries. *Environment and Development Economics, 11*(3), 371–391.

Nardi, B. (Ed.). (1996). *Context and consciousness: Activity theory and human-computer interaction.* MIT Press.

Nikolaidou, Z., & Bellander, T. (2018). Health literacy as knowledge construction: Learning about health by expanding objects and crossing boundaries in networked activities. *Learning, Culture and Social Interaction, 24*. https://doi.org/10.1016/j.lcsi.2018.11.003

Novoa, A. (2015). Mobile ethnography: Emergence, techniques and its importance to geography. *Human Geographies – Journal of Studies and Research in Human Geography, 9*(1), 97–107.

Nzeadibe, T., & Iwuoha, H. (2008). Informal waste recycling in Lagos, Nigeria. *CWRM, 9*(1), 24–31.

Ramusch, R., & Lange, U. (2013). Role and size of informal sector in waste management – a review. *Waste and Resource Management, 166*(2), 69–83.
Roth, W. M., & Lee, Y. J. (2007). "Vygotsky's neglected legacy": Cultural-historical activity theory. *Review of Educational Research, 77*(2), 186–232.
Samson, M. (2009). Wasted citizenship? Reclaimers and the privatised expansion of the public sphere. *Africa Development, 34*(3–4), 1–25.
Samson, M. (2010). *Refusing to be cast aside: Waste pickers organising around the world*. WIEGO.
Sheller, M. (2013). Sociology after the mobilities turn. In P. Adey, D. Bissell, K. Hannam, P. Merriman, & M. Sheller (Eds.), *The Routledge handbook of mobilities* (pp. 45–54). Routledge.
Swanton, D. (2014). Waste. In P. Adey, D. Bissell, K. Hannam, P. Merriman, & M. Sheller (Eds.), *The Routledge handbook of mobilities* (pp. 288–297). Routledge.
Timm, S. (2015). *Modalities of regulation in the informal economy: A study of waste collectors in Cape Town.* PhD thesis. University of Cape Town.
Tuori, M. (2009). *Strengthening informal supply chains: The case of recycling in Bandung, Indonesia.* MEng thesis. Massachusetts Institute of Technology.
Urry, J. (2007). *Mobilities*. Polity Press.
Wilson, D., Kanjogera, J., Soós, R., Briciu, C., Smith, S., Whiteman, A., Spies, S., & Oelz, B. (2017). Operator models for delivering municipal solid waste management services in developing countries. Part A: The evidence base. *Waste Management & Research: The Journal for a Sustainable Circular Economy, 35*(8), 820–841.

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