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## Seeking equity and justice in urban freight: where to look?

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### ABSTRACT

Urban freight systems embed and reflect spatial inequities in cities and imbalanced power structures within transport decision-making. These concerns are principal domains of “transportation justice” (TJ) and “mobility justice” (MJ) scholarship that have emerged in the past decade. However, little research exists situating urban freight within these prevailing frameworks, which leaves urban freight research on socio-environmental equity and justice ill-defined, especially compared to passenger or personal mobility discussions. Through the lens that derives from TJ and MJ’s critical dialogue, this study synthesises urban freight literature’s engagement with equity and justice. Namely, the review evaluates: How do researchers identify equitable distributions of urban freight’s costs and benefits? At what scale do researchers evaluate urban freight inequities? And who does research consider entitled to urban freight equity and how are they involved in urban freight governance? The findings help inform researchers who seek to reimagine urban freight management strategies within broader equity and justice discourse.

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## 1. Introduction

Decades-long growth in urbanisation and the more recent surge in e-commerce have spurred concerns around the uneven impacts of freight’s swelling urban footprint. Transport scholars note increasing conflicts between freight vehicles and vulnerable road users, like bicyclists and pedestrians in dense urban areas (Conway et al., 2013; Pitera et al., 2017). Meanwhile, environmental justice (EJ) scholars have long measured unequal exposure to freight traffic pollution along socio-economic and ethnic lines (Schweitzer & Valenzuela, 2004).

However, relatively few urban freight studies engage with social equity (Strale, 2019). Those that do usually avoid critical discussions contained in justice-oriented theory, instead portraying the movement of goods as an “apolitical science of circulation” (Chua et al., 2018, p. 624). In the U.S., for instance, apoliticising urban freight overlooks

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a history of city industrial zoning practices, infrastructure construction, exclusionary decision-making, and consequent path dependency that placed key logistics facilities including highways, manufacturing plants, warehouses and distribution centres disproportionately near low-income households and non-white, populations of colour (Bullard et al., 2004; Mohai & Saha, 2015; Yuan, 2018a, 2018b). The longitudinal effects of these institutional decisions are still largely visible today (Shertzer et al., 2022).

Transportation research also inconsistently defines and measures equity. In a review of equity in transportation literature, Lewis et al. (2021) describe equity as an empty conceptual space that “authors then fill ... either explicitly with clearly defined arguments or implicitly with whatever idea of justice intuitively comes to mind” (p. 2). Arbitrarily engaging with equity concepts, the authors argue, creates confusion that is both *normative* (e.g. what does an equitable urban freight system look like?) and *positive* (e.g. what measurable thresholds determine whether an urban freight outcome is inequitable?). Consequently, most equity research measure unequal distributions of burdens and/or benefits but spend less time identifying when and why unequal distributions are unjust.

Therefore, this paper synthesises prevailing discourse around equity and, by extension, justice in transportation research and urban freight literature. The theoretical review centres two justice frameworks to emerge in transportation literature in the past decade: “Transportation Justice” (TJ) and “Mobility Justice” (MJ), detailed in titular books from Karel Martens (2017) and Mimi Sheller (2018), respectively (Section 2). These works are major touchpoints in evolving theories of justice in transportation research (Verlinghieri & Schwanen, 2020), with which engagement of urban freight issues are notably absent. This study draws on these frameworks to inform the following research questions (RQ):

- RQ1: How do researchers identify equitable distributions of urban freight’s costs and, especially, benefits?
- RQ2: At what scale do researchers evaluate urban freight inequities?
- RQ3: Who does research consider entitled to urban freight equity and how are they involved in urban freight decision-making?

These RQs inform a literature review methodology (Section 3). The results overview literature’s understanding of urban freight equity and justice in alignment with the RQs (Section 4). The discussion identifies considerable gaps in mainstream urban freight literature’s understanding of equity and justice (Section 5), while the conclusion scopes future research directions (Section 6).

## 2. Theoretical review

Discussions of justice within the transport field have evolved since at least the early 1990s. For instance, Soja (2010) centres his spatial justice theory around a 1996 civil rights victory between organised bus riders and the Los Angeles Metropolitan Transport Authority. The case illustrated how defunding transit lines that served low-income and racial minority commuters fundamentally challenged who has the “right to the city” (Lefebvre, 1996). Transportation research has since challenged the utilitarian logic embedded in the cost–benefit analyses that transport authorities use to prioritise infrastructure

investments for privileged road users, namely private vehicle owners (van Wee, 2012). These critiques and others have pushed the field’s understanding of transport’s societal value toward a holistic view of mobility, potential for mobility, and accessibility as fundamental to one’s liberty, well-being, and social inclusion (Lucas, 2012).

The subsequent discourse is nuanced, multi-disciplinary, and occasionally at-odds. Namely, two theoretical frameworks have emerged (see Table 1):

1. TJ: a modified, liberal egalitarian perspective that informs the fair distribution of transport’s social benefit.
2. MJ: a critical social science perspective that challenges scalar and political assumptions when negotiating more equitable distributions in transport.

Since neither theory deeply engages with urban freight, the remaining review of theory establishes a baseline for understanding these theories’ foundational concepts. By explaining these concepts, and their implications for broader transport, the study distils RQs often missing in conventional urban freight literature.

**2.1. Informing RQ1: Transportation justice and sufficient accessibility as a “distributive sphere”**

This study situates TJ in recent planning literature that seeks to (a) define transport’s primary social benefit, namely accessibility to opportunities, and (b) argue modified, egalitarian moral principles by which to fairly distribute it. For example, Pereira et al. (2017) bridge a dialogue between Rawls’s difference principle and Sen/Nussbaum’s Capabilities Approach (CA). The former principle justifies transport inequalities if they (a) derive from fair equality of opportunity or choice and (b) work to benefit the worst-off members of society. CA helps define accessibility as a human “capability”, in which high accessibility represents the freedom of choosing and achieving a range of possible social, economic, and health-related activities across space and time. A reduction in accessibility inevitably implies a decrease in choice.

**Table 1.** Linking prevailing mobile justice theories to missing questions in urban freight research.

	Foundational concepts	Implications for transport	Examples of missing RQs in urban freight
Transportation Justice (TJ)	<ul style="list-style-type: none"> <li>• Distributive spheres</li> <li>• Modified, liberal egalitarianism (Rawls’s difference principle, sufficientarianism)</li> <li>• Capabilities Approach (CA)</li> </ul>	Accessibility is an important human capability to freely participate in society. Fair transport institutions prioritise programmes that provide enough accessibility for the worst-off.	RQ1: How do researchers identify equitable distributions of urban freight’s benefits (and costs)?
Mobility Justice (MJ)	<ul style="list-style-type: none"> <li>• Multi-scalarity</li> <li>• Recognition and representation</li> <li>• Mobility commons/ commoning</li> </ul>	TJ over-simplifies its own political contradictions. Mobility injustices are multi-scalar and informed by unequal political power. Deliberate attention must be given to scalar inequities and whose knowledge and participation is privileged in decision-making.	RQ2: At what scale do researchers evaluate urban freight inequities? RQ3: Who does research consider entitled to urban freight equity and how are they involved in urban freight governance?

Martens's (2017) formulation of TJ theory draws primarily from Walzer's "Spheres of Justice" and Dworkin's "luck" egalitarianism. Drawing on the former author, Martens argues accessibility is transport's primary social benefit belonging to a "distributive sphere". Accordingly, the distribution of accessibility across individuals should be mostly autonomous from the dominating influence of other spheres (e.g. individual wealth) to avoid injustice. The acquisition of wealth may improve one's capability to access more opportunities, but injustice occurs when wealth acquisition, or lack thereof, leaves opportunities for individuals inaccessible. The fair distribution of accessibility therefore possesses an "internal moral logic" distinct from other distributive spheres, as well as other human capabilities (Vecchio & Martens, 2021). For example, one's need or freedom to a healthy and safe environment is its own distributive sphere that considers transport's negative externalities in conjunction with all environmental hazards.

Martens then evokes Dworkin's thought-experiment to expand Rawls's difference principle. The thought-experiment posits that self-interested castaways on a desert island have equal resources, clams in this case, with which to barter. The castaways then auction for accessibility based on personal preferences (e.g. living further or closer to the village centre) while also insuring against "brute bad luck", or unforeseen circumstances that impede accessibility (e.g. a broken leg). It follows rational individuals would want the option to insure against a minimum level of bad accessibility luck in most cases. Therefore, it is impractical and unimportant that everyone have equal accessibility, but that accessibility is kept above a sufficient and socially acceptable poverty line (Golub & Martens, 2014). What matters is that everyone has enough accessibility.

TJ's principles tailor to the responsibilities of public planners and policymakers. TJ delineates a "domain of justice" in which authorities prioritise and subsidise access for populations below agreed upon accessibility threshold(s). Populations above the threshold(s) fall in the "domain of free market", which TJ tolerates if the high accessibilities do not deteriorate marginal accessibility for the worse-off and are self-financing (Martens, 2017, pp. 142–143). While Martens proposes a culturally contextual and democratically deliberative approach to accessibility planning, most accessibility analyses are defined from the top-down. Although there exists some exception (e.g. Stewart, 2017; Vecchio, 2020).

Nevertheless, TJ implies democratic participation, like environmental preservation, is a "boundary condition" to accessibility planning and policymaking, rather than a guiding principle (Vecchio & Martens, 2021). TJ's state-centric focus has produced criticisms of paternalism (Vanoutrive & Cooper, 2019) and disconnect from community actors and advocates (Karner et al., 2020). Cooper and Vanoutrive (2022) demonstrate how having "enough" accessibility may not be intuitive for those identified as having insufficient accessibility as any threshold, "may not reflect the amount of accessibility people wish to use on a daily basis or the value of accessibility in their own life" (p.8). Moreover, inequities in accessibility may simply reflect broader imbalances in transport decision-making.

TJ's theory of fairness for sufficient accessibility is important for informing the study's RQ1. *What are urban freight's distributive spheres, and by what principle should urban freight's social benefit be fairly distributed?* However, TJ's scope is narrow and "leaves unanswered the political problem of how such a utopian ideal might be achieved under existing conditions" (Sheller, 2018, p. 91). Therefore, realising equity in urban freight requires a more expansive definition of justice.

## 2.2. Informing RQ2: Mobility justice and transport's "multi-scalar" inequities

MJ defines mobility in a much broader sense than TJ's from-A-access-B transport. Sheller's work on mobility dissects the politics of uneven bodily movements and frictions (2016); racialised, ableist, and sexist histories in physical and digital infrastructure (2015); and indigenous displacement, resistance, and surveillance in the face of ecological degradation, climate disaster, and supply chain militarism, a concept this paper returns to (2012). Although not specific to the urban context, these works understand the city not as an isolated space but a nexus of global power relations that "permeates and works across all scales at once" (Sheller, 2018, p. 41). In other words, mobility's inequities are "multi-scalar:" transport conflicts resolved at one scale do not necessarily resolve conflicts at another scale.

For instance, New Urbanism/Smart Growth schools advocate transit-oriented development, active transport programmes, and/or digitally-connected mobility systems as an inclusive alternative to the private vehicle-oriented systems that historically served wealthier, suburbanising commuters. However, these systems can also fail to account for marginalised users and link to familiar profit-oriented development (Sheller, 2015), which has resulted in displacing long-established residents and local businesses in some circumstances (e.g. Padeiro et al., 2019). Consequently, historically marginalised residents have received some of these proposals in their neighbourhood with suspicion or open hostility, despite ostensibly standing to benefit from improved accessibility or reduced traffic (e.g. Hoffmann, 2016, p. 84).

Meanwhile, energy justice scholars have traced "chains of embodied energy injustices" (Healy et al., 2019): from the intensive energy consumption in deindustrialising, high-income countries and the downstream sites in which resources are extracted, processed, transported, and disposed of in low-income countries or at the peripheries of metropolitan regions. Within the transport space, Henderson (2020) notes how injustices hidden in climate-minded electric vehicle (EV) policies "jump scale". EV boosters may emphasise localised climate targets, corporate greenwashing, and liberal assumptions of choice-freedom and automobility ("people simply want cars", p. 1997) while overlooking external life-cycle costs and uneven upstream-downstream power relations. For example, unequally bearing environmental costs associated with EV manufacturing, mineral mining, intensified power generation, and grid infrastructure construction, in addition to further entrenching historical inequities in car-oriented systems.

These examples illustrate the extent of multi-scalar inequities in urban mobility, which stretch beyond the city limits and even the transport field. As such, RQ2 inquires *the extent of multi-scalar inequities in urban freight*.

## 2.3. Informing RQ3: Governing the mobility "commons"

MJ's final piece concerns political imbalances within transport decision-making. Sheller (2018) argues for a nested approach to the democratic governing of the "mobility commons", or the collective right to move or stay put. Perhaps the approach most familiar to urban and environmental justice scholars is a loosely adapted "three-dimensional" epistemology emphasising distribution, recognition, and representation or the similarly termed "equity, diversity, and democracy" (Fainstein, 2011; Schlosberg, 2013). The

epistemology draws largely from Iris Marion Young's politics of difference and, especially, Nancy Fraser and Axel Honneth's debate on maldistribution and misrecognition. Recognition refers to the acknowledgement and respect of socially differential and intersectional identities and experiences. Low and Iveson (2016), for instance, incorporate recognition and feminist ethics of care in their propositions for just urban spaces.

Representation refers to direct participation in democratic procedures. The right to assemble and participate in decision-making is a human capability (Basta, 2016), with principles of fairness rooted in information access, community-based knowledge production, and informed consent. Karner et al. (2020) review decision-making strategies in transportation planning (e.g. traditional expert-led elicitation, Civil Rights litigation, participatory budgeting, and community-led analysis) and conclude transportation justice "wins" typically involve novel combinations of state and society-centric strategies. However, democratic decision-making is not free of criticism: perfunctory engagement with communities does not guarantee equitable outcomes nor recognitional empowerment (e.g. Butz & Cook, 2019).

From the top-down, tokenised forms of public solicitation have long been challenged (Arnstein, 1969). Ardent critics of top-down processes connect U.S. environmental racism and mass incarceration to a long history of state-sanctioned violence that perpetuates racial capitalism, urging activists to see the state as an adversary rather than an ally (Pulido, 2017). From the bottom-up, parochialism and privileged social differences in groups can stymie broader justice aims, e.g. "NIMBY" push-back against affordable housing placement (Scally & Tighe, 2015).

Governing the mobility commons is rife with conflicting social interests. Nevertheless, MJ focuses acts of mobility *commoning* that encompass communal decision-making practices that politically rethink mobility's social value and governance. Nikolaeva et al. (2019) showcase global examples of from and for the bottom engagements with mobility that contrast the prevailing governing logics of austerity that service "scarcity-producing regimes", namely car-centric enclosures of public space. For instance, how opposition from community coalitions in post-Pinochet Chile successfully rerouted highway construction around several disadvantaged neighbourhoods in Santiago, guaranteed residents' right to stay put, and nationally transformed the protocols of government engagement with communities. Therefore, RQ3 simultaneously probes *who has the right to the mobility commons in the context of urban freight and who is involved in its governing*.

### 3. Methodology

The above review describes two prevailing justice theories in transport. TJ concerns the fair distribution of accessibility to opportunities (transport's primary social benefit) from the vantage point of the planner-analyst and policymaker. Meanwhile, MJ questions TJ's political assumptions and raises challenging questions on how affected populations can fairly govern mobility across all scales. Neither theory engages with urban freight issues, leaving discourse surrounding equitable and just urban freight systems ill-defined. This ambiguity necessitates deeper engagement.

Literature reviews can be an important step to grounding multi-disciplinary inquiries into foundational theories, and urban freight is no stranger to systematic review (e.g.

Wolpert & Reuter, 2012). However, most reviews aim to consolidate findings and identify avenues for research rather than evaluate the studies' content – especially pertaining to equity and justice (Strale, 2019). Engaging with equity may not intuitively conform to urban freight research's largely operational and managerial focus, in which business logic and “unreconstructed logical positivism” is endemic, i.e. the assumption that data can explain all phenomena and data do not lie. Consequently, reviews that do attempt to meta-analyze urban freight literature for equity conclude that research simply lacks serious engagement (e.g. Baydar et al., 2017).

However true this may be, it tells nothing on *how* urban freight research engages these topics. Most pertinent to this study's methodology, Lewis et al. (2021) construct a conceptual space using several definitions of equity that they then employ to unveil transportation authors' explicit and implicit philosophical frameworks. However, as discussed, a holistic view of justice includes and extends beyond fair distributive principles, requiring an understanding of urban freight's multi-scalar and political elements. Therefore, this study endeavours to interrogate urban freight literature's normative content, including implicit and explicit assumptions regarding equity and justice. High-level questions derived and adapted from TJ and MJ's critical dialogue direct the review (see Table 1).

Urban freight literature employs variable nomenclature to discuss similar logistical phenomena within cities (Wolpert & Reuter, 2012). Therefore, this study adopts several key words these authors and others utilise with additional language prevalent in “last-mile”, “home” and “on-demand” delivery research and research relating to equity and justice. The authors extracted scientific literature from leading scientific databases: Elsevier Scopus, Google Scholar, and Clarivate Web of Science.<sup>1</sup>

After removing irrelevant, non-English ( $n = 1$ ), and duplicate articles, the extracted studies were inputted into a PRISMA workflow ( $N = 150$ ). The extracted articles were subjected to title/abstract then full text screening, based on the following exclusion criteria: (a) non-urban, (b) does not concern the physical mobility or access to goods (e.g. studies concerning supply chain management, unequal proximity to warehouses, and non-material logistical flows); and (c) does not explicitly refer to at least one key equity and justice objective described in the theoretical review, eliminating 108 articles. The authors excluded an additional eight articles: two due to the inability to locate digital copies and six upon deeper reading, according to the exclusion criteria. The final sample includes 34 articles. Table 2 summarises the classification table, which was compiled using spreadsheets.

## 4. Results

### 4.1. RQ1: Urban freight's distributive cost and social good

Given the broad overlap of cost/benefits observed in the literature, it is useful to categorise studies by their distributive sphere. Most reviewed articles concern the creation of a safe and healthy environment through mitigation of urban freight's negative externalities ( $n = 13$ ) (see Figure 1). These articles typically align with EJ literature and focus directly or indirectly on the adverse health effects of diesel combustion-derived criteria air pollution, of which freight vehicles are the most prominent emitter. However, articles also measure unequal distribution of in-transit hazardous material spills (Schweitzer, 2006) and collisions and resulting injuries with heavy goods vehicles (Yuan & Wang, 2021).

**Table 2.** Classification table summary of sampled urban freight literature ( $N = 34$ ).

Studies	Distribution (RQ1)		Scale (RQ2)		Involvement (RQ3)	
	Cost/good	Principle	Space/time	Commodity chain	Entitled	Participant
Choi et al., 2021 (modelled different scenarios); de Oliveira et al., 2019; Keeling et al., 2021; Luo et al., 2022; Schaefer & Figliozzi, 2021	Accessibility	Modified egalitarianism	CDP-based accessibility	Online-ordered goods	All online consumers, with some emphasis on populations excluded from digital and physical services.	Free market at top, government regulation at bottom.
Berkowitz et al., 2018; Breitbarth et al., 2021; Cholat & Daconto, 2021; Figliozzi & Unnikrishnan, 2021; Sanchez-Diaz et al., 2021	"	"	Home-based accessibility	"	"	"
Demetillo et al., 2021; Houston et al., 2008; Karner et al., 2009; Lee et al., 2009; Ryan, 2017; Schweitzer, 2006; Yuan & Wang, 2021	Air pollution, traffic crashes, hazmat spills	Simple and modified egalitarianism	Proximity to logistics infrastructure and activity	Heavy trucks transporting globally traded commodity	Marginalised populations residing near logistics infrastructure	Municipal and regional regulatory authorities
Garcia et al., 2013; Hricko et al., 2014; Matsuoka et al., 2011; Schneller et al., 2022	Air pollution	Representation, community driven participatory research (CDPR)	Proximity to logistics infrastructure and activity	"	"	Municipal and regional regulatory authorities, environmental advocates, and university partners
De Lara, 2018; Nogue-Alguero, 2020	Air pollution, labour precarity	De-growth, multi-scalar political ecology	Critical history perspective of port proximity	"	Marginalised populations residing near ports, dock and truck workers	Waterfront commoning, authorities wedding environmental and labour justice
Bates et al., 2021; Bates & Friday, 2018; da Costa Lage & Rodrigues, 2021; Lopez et al., 2019; Lord et al., 2022; Vecchio et al., 2022	Labour precarity induced by gig economy	Contested sustainability, recognitional justice, "data justice"	Non-spatial ethnographies of worker experiences	"Crowd logistics"	Delivery couriers, including those of marginalised status	Regulatory and union intervention into labour marketplace
Coetzer & Pascarel, 2014; Das et al., 2021; Navarro et al., 2021	Delivery and ordering efficiency for low-income retailers	Implicit Libertarianism	Delivery efficiency for low income retailers in Global South cities	Consumable retailer goods shipped conventionally, crowd logistics, or pick-up	Low-income consumers or retailers	Retailers/carriers, socially responsible enterprises, some government programmes
Buldeo Rai et al., 2017; Garus et al., 2022	"Triple Bottom Line"	NA	Non-spatial evaluation of last-mile delivery modes	Online-ordered goods	Buldeo Rai et al. (2017) do not specify; Garus et al. (2022) suggest digitally excluded consumers	Delivery providers, regulatory authorities

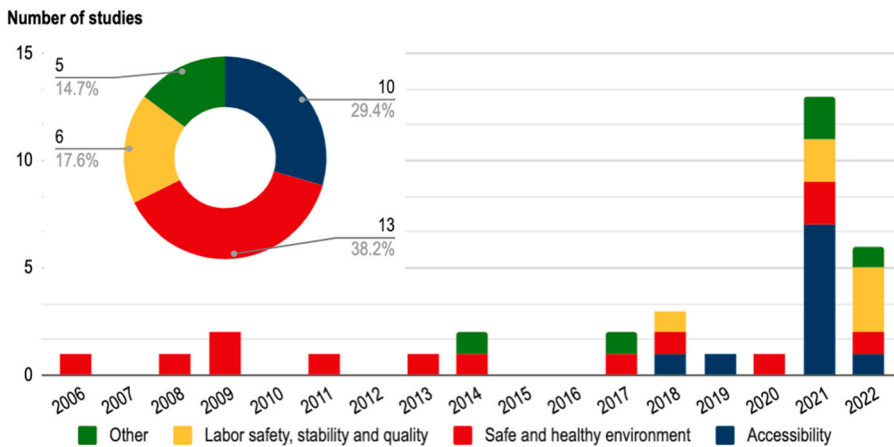
Note: Colour refers to distributive sphere: blue = accessibility, yellow = labour stability, red = safe and healthy environment; green = other.

Most EJ articles do not explicitly specify their normative equity principle. This study infers, based on articles' empirical methodology and concluding reflections, that most urban freight-related EJ research prescribes mainstream egalitarian perspectives to outcomes: public intervention should primarily benefit populations most affected by pollution (i.e. a loosely implied Rawlsian Difference Principle) or eradicate inequalities altogether. For instance, Schneller et al. (2022) reflect on the publicly preferred outcomes of rerouting freight completely around a subsidised housing project located next to an intermodal freight terminal in Albany (New York) or relocating residents to a less impacted neighbourhood. The implication is that no one should be exposed to freight's health impacts above a certain risk level, or at least no more than wealthier populations. However, this article (and three others) additionally centralise the role of community-driven participatory research (CDPR) (Garcia et al., 2013; Matsuoka et al., 2011). This study discusses both spatial methodologies and participatory strategies (and their political limitations) in the following sections.

Six studies pertain to the working conditions of urban delivery drivers. These studies explore the negative effect of recent urban delivery trends on the safety, stability, and quality of goods transport work. Given its recognitional and representational elements, these effects will be discussed further in the following sections.

Five studies do not neatly classify into any distributive sphere. Of these, three studies make the case for solutions that improve the delivery and ordering efficiency for retailers that serve primarily low-income consumers in global south cities. These authors suggest socially responsible, entrepreneurial logistics solutions can improve free market conditions for low-income retailers. Accordingly, government intervention should be minimised to ensure these retailers have equal competitive access to the logistics marketplace (e.g. by improving infrastructure in informal settlements or reducing cargo/package theft through police enforcement) (Navarro et al., 2021).

Two studies adopt a broader "Triple Bottom Line" sustainability perspective (i.e. social, environmental and economic sustainability or "people, planet, profit"), a conceptual framework not uncommon in urban freight research (Buldeo Rai et al., 2018). These studies classify equity as a separate indicator among wider "social sustainability" metrics (e.g. noise,



**Figure 1.** Publishing year and total number of studies by distributive sphere.

safety, digital exclusion, etc.), although equity is not empirically analyzed in either. It is worth noting that a baseline assumption of the Triple Bottom Line – that environmentally and socially responsible solutions can also be self-financing – is not without contradictions and challenges to financial scaling are observed across many proposed “sustainable urban freight solutions” (e.g. van Duin et al., 2016). In fact, the conceiver of the Triple Bottom Line business approach has since challenged the concept as having “failed to bury the single bottom line [profit] paradigm” (Elkington, 2018).

More recently, a large portion of studies evaluate equitable access to goods ( $n = 10$ ). Many studies spawned from the in-person shopping and economic restrictions imposed by COVID-19 shutdowns, which created unequal socio-economic and health impacts across populations. Half of studies published after 2020 explicitly pertain to COVID-19, with accessibility-based solutions purportedly benefitting those economically impacted by and medically vulnerable to contagion.

The prominence of accessibility within TJ’s framework necessitates dedicated discussion in equity-oriented urban freight research. Most studies measured socio-spatial disparities between population’s accessibility levels to delivered goods. Several studies also characterise populations with low levels of goods accessibility as most at-risk to social and digital exclusion (e.g. low-income, low education attainment, non-citizens/ racially marginalised, and/or elderly), and are therefore entitled to publicly-subsidised accessibility improvements. However, only three accessibility studies reference TJ’s conceptual and empirical principles (Figliozi & Unnikrishnan, 2021; Luo et al., 2022; Sanchez-Diaz et al., 2021). These authors suggest public authorities are responsible for ensuring sufficient home-based accessibility to essential and consumer goods. They recommend higher investments placed into targeted population clusters and/or reframing parcel delivery under a universal service obligation in which everyone is entitled to equal service, paralleling the historical framing of global north postal services.

Justifying public intervention should require evidence of a social benefit for mobilising freight systems, of which this review finds some data. Berkowitz et al. (2018) found that home deliveries of prepared meals may reduce emergency room visitations among low-income seniors. Case studies outside the review have also explored the accessibility benefits of serving these populations, such as grocery ordering and pick-up at nursing homes and senior centres (Lagisetty et al., 2017) or the use of demand-responsive buses to home-deliver groceries during COVID-19 shutdowns (Shared Use Mobility Center, 2020). Therefore, home delivery solutions can present a non-travel-based alternative for improving accessibility to some goods for populations living below a range of accessibility poverty thresholds (e.g. in a “food desert”) and with low mobility potentials (e.g. populations with physical mobility impairments). Although, these solutions would have to balance the socio-psychological and cultural benefits that in-person shopping brings and weigh against alternative travel-based proposals.

#### **4.2. RQ2: Multi-scalar equity in a fragmented urban distribution chain**

Two EJ-related articles analyze proximity to freight infrastructure – especially ports, highways, and intermodal rail yards – using buffers to proxy health risks for mobile-source air pollution rather than direct traffic flow data (Hricko et al., 2014; Ryan, 2017). Four articles analyze incidence data using atmospheric modelling (Demetillo et al., 2021), spatial

econometrics (Yuan & Wang, 2021), and cluster analysis (Schweitzer, 2006) to link hazard exposure among vulnerable populations. Karner et al. (2009) measure readings from local air quality receptors to explore the effect of rerouting port traffic around a commercial corridor in a predominately Hispanic neighbourhood in San Diego (California). They found that rerouting efforts successfully reduced criteria air pollution on the targeted route but led to large proportional increases in emissions along non-target streets and a small net-increase throughout the network – pointing to a scalar trade-off between local and regional emission targets.

Consequently, many researchers have stressed the importance of regional public partnerships and cross-sector coalitions (Garcia et al., 2013; Matsuoka et al., 2011), given the multi-jurisdictional nature of regional freight flows in harbour cities and inland hubs that stretch from major terminals, along highway and rail corridors, to warehousing and inter-modal facilities in industrial outskirts.

However, these perspectives still carry a region-scale framework and avoid globalised prescriptions, e.g. around consumption. Most studies and identified public authorities assume (or do not question) that global trade must grow and, therefore, ports must expand, infrastructure be constructed, and fleets rerouted, consolidated, or converted to cleaner models, rather than dramatically reduced, to maintain regional and/or international competitiveness. Political ecologists and ecological economists have challenged “green growth” narratives in high-income countries (Kallis et al., 2018), with two authors observing how port development proposals often render community and worker health impacts as separate or second order despite framing regional sustainability benefits (De Lara, 2018; Nogue-Alguero, 2020).

To illustrate a negative consequence of decoupling environmental and labour concerns, De Lara (2018) cites the legislative shortfall of Port of Los Angeles’s Clean Truck Program to enforce reclassification of drayage drivers as direct-hire employees rather than independent contractors, who are subject to looser labour and wage protections. Not only does the freight sector’s long tail of small operators have higher barriers to investing in green fleets than larger logistics players, adding possible strain to already precarious labour conditions, but also trucker classification and misclassification as independent contractors hinder efforts to both reduce emissions and improve driver wages (Zabin & Appel, 2019).

Beyond the port sector, remaining studies evaluate last mile mobility of/access to home delivered goods. The sample offers equity considerations of two prominent “sustainable” delivery alternatives. First, the Crowd Logistics (CL) model offers digital platforms to connect free vehicle capacity and a flexible supply of “voluntary” gig workers or casual drivers to directly serve home demand ( $n = 9$ ). On the surface, CL suggests a democratisation of traditional delivery services through enhanced community connectivity that, “exploits a new spirit of collaboration and commercialises social networks in a way that can be beneficial from an economic, social and environmental point of view” (Buldeo Rai et al., 2017, p. 39).

However, Lord et al. (2022) note how app-based, on-demand delivery models have destabilised urban logistics labour, citing the many ways in which CL work is far from voluntary (discussed further in the next section). Moreover, rather than substituting more energy intensive shopping patterns, Lord et al. note on-demand deliveries may create a “rebound

effect”, in which increased efficiencies in distributing and accessing goods induce more consumption and undermine its purported environmental sustainability.

Second, collection and delivery points (CDPs) in neighbourhoods (e.g. parcel lockers) improve operational efficiencies by removing door-to-door circulation, curtailing package theft and missed deliveries ( $n = 5$ ). Given that privately-owned CDPs follow a market-oriented spatial distribution, CDPs generally co-locate near younger and wealthier populations in dense urban neighbourhoods. However, using factor analysis, Luo et al. (2022) concluded the spatial distribution of CDPs in metropolitan Wuhan (China) did not satisfy the demands of most residents; meanwhile, Schaefer and Figliozzi (2021) labelled the lack of spatial coverage for populations that “need” CDP access a market failure. Consequently, authors propose a more equitable spatial distribution of CDPs – facilitated through strong regulatory levers and subsidy – would locate in underserved population clusters, at certain transit stops (Keeling et al., 2021), or drug/convenience stores on high-traffic corridors (de Oliveira et al., 2019).

Most authors’ framing of equitable, last mile delivery alternatives narrow their scalar scope to the delivery zone. This focus is due, in part, to the fact that many of these solutions require high customer densities to be cost-effective and operationally efficient. A consequence is a lack of research focus on middle mile urban freight transport, such as in proximity to freight-attracting consolidation hubs. Given the spatial distribution of logistical facilities can concentrate near marginalised populations, which has been linked to historical land use injustices in Southern California (Yuan, 2018a, 2018b), occluding the middle mile likely overlooks further socio-environmental inequities.

### **4.3. RQ3: Uninvolvement in urban freight governance**

As discussed, multi-sector collaboration with community-led coalitions has been a central feature to transformative legal victories and policy shifts towards more just outcomes in transport (Karner et al., 2020). Two articles identified dozens of community-based environmental advocacy groups operating across cities in the U.S., which have been essential in connecting local organising to regional policymaking, facilitating peer-to-peer training for civically engaged science and data collection, forging and monitoring public health policies related to urban freight (Matsuoka et al., 2011; Schneller et al., 2022). For example, the university-housed Trade, Health, Environment (THE) Impact Project in California demonstrated the role community-based participatory research played in informing San Pedro Bay Ports’ 2006 Clean Air Action Plan, adding public health language to port development plans, and delaying infrastructure construction projects that fail to conduct a health impact assessment (Garcia et al., 2013).

However, coalition-based strategies to addressing injustices embedded in more contemporary urban freight trends remains limited. This omission is especially apparent across CL platforms, the competitive success of which hinges on managerial austerity (i.e. not owning or insuring vehicle assets), cheap labour, and fast deliveries. This service model requires digital platform companies to employ algorithmic mechanisms in the back end and control what data is visible to consumers and workers in the front, which simultaneously disconnects consumers from the human cost of free shipping, attempts to boost courier productivity, and defund courier down-time between pickups. Computer scientists note how surge-based delivery pricing, biased performance

ratings, and gamified quota targets not only introduce precarious labour conditions for couriers but also societal costs, such as favouring polluting-but-faster car-based couriers over bicycle couriers or pressuring couriers to drive fast and evade traffic laws (Bates et al., 2021; Bates & Friday, 2018; Lord et al., 2022).

Though companies and some workers promote the flexibility of gig work, other workers observe the platform's more "despotic" dimensions. Lage and Rodrigues (2021), for instance, connect the experiences of black, app-based delivery drivers in São Paulo (Brazil) to how algorithmic control and surveillance creates an "implicit mandate" to overwork, risk bodily health, and entrench historical, racialised inequities. Consequently, the geography of delivery services closely resembles the socioeconomic segregation in some Latin American cities, with demand emanating from "privileged immobile" consumers who work-from-home in high-rent neighbourhoods and supply fulfilled by workers residing in low-rent and informal settlements who must be hyper-mobile to subsist (Vecchio et al., 2022). These articles argue that improving labour quality, safety, and stability must go beyond standardising or tweaking platform-side data sharing and algorithms and address underlying political imbalances within the digital, on-demand market structure.

In addition to communities negatively impacted by freight transport, urban freight workers possess a stake in deliberating just urban freight outcomes. In line with MJ's discussion on mobility commoning, there is a need for urban freight research to legitimise community-based knowledge production. Some articles offer insights into more democratic forms of labour organisation in urban freight (Bates et al., 2021; Lage & Rodrigues, 2021). These articles observe "algoactivist" resistance that include online worker forums fostering care ethics or cooperatives offering alternatives to owner-based service models, in which logistics workers common mobility assets and data to renegotiate democratic control over their own labour conditions. Although examples are small-scale, they beg additional research on community- and worker-led freight systems, including those at the margins of metropolitan peripheries and global south cities.

## 5. Discussion

A core finding of this review is a failure to adequately consider urban freight in prevailing transport and mobility justice discussions. Often when transport researchers or practitioners discuss urban freight issues the movement of goods and the people who move them are hostile interlopers in an idealized clean and livable city, such as media focus on e-commerce bringing "chaos" to neighborhood streets (Haag & Hu, 2019). Consequently, many urban freight management strategies attempt to minimise freight's *visible* presence in cities, especially in wealthier and denser neighbourhoods where consumer demands are highest. Such an approach certainly mitigates some of urban freight's undesirable externalities. However, this paper reveals how viewing urban freight solely in reductive terms can be myopic.

First, it oversimplifies discussions around freight system benefits. Despite freight's "nuisances" being widely known (Browne et al., 2012), its primary social benefit is largely abstracted even though urban freight practice concerns the very sustenance of cities. When researchers do claim benefits for improving efficient freight movement or accessibility, they are usually framed in regional economic terms (e.g. Larsson & Olsson, 2017;

Wang et al., 2013). However, causality between transport investments and economic development are difficult to pinpoint at more local scales as most empirical studies are macroeconomic and use aggregated data (Ferrari et al., 2019). In fact, correlations between freight infrastructure construction and economic indicators sometimes appear weak or negative for the neighbourhoods that host said infrastructure (e.g. Grobar, 2008).

That is not to say macroeconomic outcomes are unimportant and may be a political priority for some communities, including some benefits that derive from logistics cluster employment (Rivera et al., 2016). However, TJ's view of transport's social good raises complicated but equally important questions regarding how urban freight systems underpin human capabilities to better access items and services. Be it stocking medicine shelves, delivering hot meals, and the many instances in which freight systems are mobilised to bridge accessibility gaps (e.g. Haider et al., 2022).

Second, it overlooks multi-scalar inequities in urban freight systems. For instance, people-centered "Complete Street" plans often de-prioritise urban logistics zones and omit design considerations for freight activity (Chappele, 2014). Failing to account for urban freight on freshly redesigned streets can risk conflicts between commercial vehicles and vulnerable road users (Conway et al., 2013; Pitera et al., 2017), especially in marginalised neighbourhoods. However, urban freight's scale extends beyond the street. This review and others observe the lack of research on upstream, middle mile urban freight activity (Tejada & Conway, 2022). As warehousing and other distribution facilities concentrate many of urban freight's environmental and safety costs (Wygonik & Goodchild, 2018), neglecting the transport-related inequities generated by logistics land use decisions presents a scalar blindspot in research.

Transport and economic geographers have extensively studied warehousing's spatial reordering from the urban core to cheaper, better networked land in the suburbs (Bowen, 2008), which has increased commercial transport distances and regional emissions (Dablanc & Rakotonarivo, 2010). Conversely, certain logistics facilities that serve online and on-demand deliveries are moving closer to urban consumers to more rapidly complete orders (Rodrigue, 2020), provoking community concerns around the proximity of freight activity to people's homes and other sensitive land uses (Nowlan, 2023). The neighborhoods that host these facilities are often not the ones that benefit from the improved home-based accessibility these facilities intend to provide for more frequent online shoppers.

Consideration of the trade-offs between exurban versus urban warehouse placement has influenced recent case study research on "freight-efficient land uses" and "proximity logistics", which identify strategies to mitigate warehousing's local environmental impacts (Buldeo Rai et al., 2022; Holguín-Veras et al., 2021). Urban warehouses can seemingly aspire to be "good neighbors" with the right regulations, fleets, and facility designs; however, developers still see facilities opening near historically marginalised communities as inevitable and justified with jobs that are often low-paid and unstable, lunch spots, and (sometimes) funds for sound-proofed home windows (Buldeo Rai, 2023, p. 7). Offered guidance does not question the placement of these facilities as a political issue with equity and justice implications.

Moreover, as cities move toward gilding urban distribution centers with green and mixed-use spaces or trading cargo vans for e-bikes, multi-scalar questions regarding who benefits from these low-carbon solutions become important. For instance, despite

local production being a sustainable alternative to globalised, just-in-time distribution, Grodach (2022) observed in San Francisco (California) that the drive to preserve urban industrial zones with “maker spaces”, and turn them profitable, followed similar gentrifying pathways as the tech-driven, mixed-use land conversions that transformed the city’s housing economy decades prior.

Third, it overlooks critical histories and undemocratic structures embodied in urban freight systems. Most relevant to this discussion is the work of Cowen (2014) and critical logistics scholarship (e.g. Chua et al., 2018). Cowen traces the history of logistics from supplying Napoleon Bonaparte’s military frontlines to the Fordist “logistics revolution:” the commercial emergence of the whole systems approach to reducing freight costs (and later deregulation) that today blurs the line between global militarism, neocolonial resource extraction, and trade. Cowen argues mainstream urban freight practice seeks to restructure public space to meet demands for quick, frictionless turnover of capital. Therefore, transport and supply chain practitioners understand the city both in relation to its status in transnational trade networks and a bottleneck, “ridden with forces that disrupt efficient flows”, to be overcome, sometimes to destructive effect (2014, pp. 180–184).

Critical logistics research challenges the field’s fantasy of secure and optimised flows, long assumed to be apolitical by urban freight practitioners and researchers. Indeed, urban freight’s definition as the “movement of goods by or for commercial entities” (Rodrigue & Dablanc, 2018) obfuscates recognition of humans enmeshed in its circulation. This includes the lives and working conditions of truck and van drivers – including the contested status of women, queer, and migrant drivers (Altenried, 2019; Balay, 2018; Hopkins & Akyelken, 2022), workers at docks (Fox-Hodess, 2017), and e-commerce fulfilment centres (Benvegnù et al., 2022). Urban freight transport intertwines with uneven and multi-scalar mobility politics. Researchers observe these politics through port grabs in West African cities by global north firms (Stenmanns, 2019), humanitarian and disaster response logistics for displaced urban residents (Sheller, 2012), and food waste rescue and redistribution among food insecure populations (Davies, 2019).

This globally diverse network of mobility justice claimants raises challenging questions on who gets to participate in urban freight governance. While there is some work on collaborative strategies to urban freight management (Bjørngen et al., 2021), these studies limit participation and consensus-building to “key decision makers” within the manufacturing, wholesaler, logistics, and retail sector (Browne et al., 2018; Holguín-Veras et al., 2015). Most urban freight stakeholder engagement strategies assess corporate acceptance across various regulatory and incentive schemes, rather than involve community and labour concerns. This review does not identify any study offering the same level of comprehensive guidance for engaging non-state and non-corporate actors as negotiating participants in urban freight management.

## 6. Conclusion

This paper presents a first effort to situate urban freight research in foundational transportation and mobility justice theories. These theories have been instrumental to helping advance justice in personal- and passenger-related mobility planning and social movements but have yet to reconcile urgent inequities and imbalanced power structures embodied in cities’ urban freight systems. The study achieves this theoretical grounding by interrogating

urban freight literature's engagements with equity and justice. Namely, this paper asks: what distributions are at stake and what are authors' guiding principles? At what scales are injustices unresolved? And who is (un)involved in negotiating their resolution?

Consequently, the paper also presents the first comprehensive review of the state of equity and justice in urban freight literature. It illuminates several gaps and future directions for urban freight research:

- Identifying distributive spheres across urban freight that encompass labour quality, environmental justice, and accessibility to goods. In the case of the latter sphere, the paper explores home delivery as a public service that ensures sufficient access to goods for populations with low levels of accessibility. However, research is needed to understand the specific role urban freight systems play in expanding home or near-home based accessibility, as well as why and how they should be supported beyond the commercial sector.
- Highlighting multi-scalar inequities. The scalar scope for last mile delivery research is narrow, often occluding the impacts of middle mile urban freight movement, land use decisions in upstream distribution, and proximity to consolidation facilities. Studies occasionally take a regional perspective to community health impacts, but generally fall short in questioning more globalised, green growth assumptions. As a result, stakeholders often relegate external costs for labour and communities to mitigation tactics that are secondary compared to port, infrastructure, and warehousing expansion needs.
- Observing discrepancies in governance between those entitled to urban freight justice and those considered valid participants in urban freight decision-making. There is little consensus on how cities should democratically engage communities bisected by freight corridors and adjacent to freight-generating land uses. The exclusion of community members, advocates, and workers from the negotiating table necessitates deeper research on "from and for the bottom" freight management strategies and community-based participatory research applications in urban freight research.

Social and environmental inequities are not apolitical correlations to random external factors nor simply a byproduct of bad actors making purposely discriminatory decisions. Instead, inequities are locked-in through historical injustices and globally recirculated by today's imperfect, often callous political and economic systems (Ranganathan, 2016). As such, the project of justice – even in as narrow a focus as urban freight – will almost certainly remain a contested ideal and unfinished business. However, serious action toward justice in urban freight requires political reckoning with the field's assumptions of how benefits, burdens, and even death distribute down the urban distribution chain and who gets to have a say.

## Note

1. Full source list and search string available here: <https://tinyurl.com/3b7zt65n>

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