Micromobility and Urban Space

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Micromobility is gaining momentum in cities around the world. The benefits of increased, flexible, affordable, fun, space-efficient, and emission-free mobility and access are immediately apparent. Privately owned as well as shared electric scooters (e-scooters) have grown from almost zero in 2017 to completely dominate urban scenes across the developed world a few years later. In parallel, concerns with, *inter alia*, accident risk, littering and cluttering, undesirable use of public space, and conflicts with other modes of transport and other uses of public space have arisen at the same pace (Fearnley, 2020; Stratford, 2002). The debates on the use of public space, for what and for whom are accentuated with the advent and surge of micromobility.

Micromobility takes many forms (ITF, 2020a). This Special Issue on Micromobility and urban space accepts a broad definition, which includes *shared* and *privately-owned*, *docked* and *dockless*, as well as *motorised* (electric) and *non-motorised* mobility devices intended for single-person transport. With the current state of play, this includes (but not limited to) kick-bikes, kick-scooters, e-scooters, bicycles, e-bikes, skateboards, hoverboards, segways, electric wheelchairs/rollators, and electric unicycles.

Shared as well as privately owned micromobility offers many promises to help solve a range of policy goals – including flexible, affordable, inclusive and accessible mobility; local and greenhouse gas emission reductions; congestion relief including on-board crowding relief for public transport; complementation of public transport services to increase their catchment area; health benefits; cost efficiency; and space efficiency (Ydersbond et al., 2020; Voi, 2021; Reardon, 2020; Ziedan et al., 2021; Luo et al., 2021; Fyhri et al., 2017; Yan et al., 2021; ITF, 2020b). As this Special Issue shall substantiate, and in line with some of the references cited, the achievement of such promises cannot be taken for granted. Market forces will not, by themselves, necessarily work in those directions. Various forms of regulation of shared micromobility are therefore essential (Fearnley, 2020).

Micromobility vehicles have traditionally been in private ownership. Recent innovations, including GPS technology, smartphone apps, 4G and 5G telecommunication, mobile payment solutions, and improvements in battery technology, have brought the sharing economy to the micromobility domain. No authoritative sources have attempted to quantify the relative sizes of shared versus privately owned micromobility. However, a clear pattern can be observed in most countries: apart from e-scooters, private ownership of micromobility devices still dominates. A probable exception are cities with low bicycle use that have become victims of the shared dockless bike tsunami since the mid-2010s, of which the Chinese experience is vividly illustrated in Taylor (2018).

Regarding the impact of micromobility on the use of urban space and on transportation systems, the distinction between privately owned vehicles versus shared ones is not limited to differences in their contribution to parking and cluttering. Karlsen and Fyhri (2021) document other ways in which they differ. Privately owned e-scooters replace car trips to a larger extent than shared ones – although both predominantly replace walking. Privately owned vehicles are also used for longer trips than their shared counterpart. Shared e-scooters, on the other hand, are used as first/last mile combinations with public transport to a larger degree than privately owned e-scooters (see also Fearnley et al., 2020a). Also, shared micromobility still tends to attract the typical early adopter: young, educated, male, and high income.

The market for shared micromobility is characterised by a few factors which contribute to some of the main challenges associated with shared free-floating micromobility. *On the demand side*, there are economies of scale, much parallel to network effects in public transport (Mohring, 1972) and economies of density as demonstrated by Arnott (1996) for the taxi market. The more vehicles a shared micromobility operator supplies in an area, the more attractive (available and accessible) are their products to their consumers. For this reason, unregulated markets easily become a scene where operators, often armed with considerable venture capital, battle for market shares and future earning potential to the degree that their vehicles overflood cities. We have seen this unfold in cities including Paris, Oslo and Stockholm for shared e-scooters, and in several Chinese cities for shared dockless bikes. *On the supply side*, the cost profile of shared micromobility is unusual in the realm of transportation. Relatively speaking, investment costs are moderate to low. In addition, entry and exit costs appear low. Fluctuo, a European shared micromobility monitoring service, offers weekly updates of launches and exits across Europe. Their reports are indicative of an industry with extremely mobile fleets which can be located and relocated to wherever they generate most revenues, globally. This fact exacerbates the unregulated market's tendency to flood cities– sometimes overnight.

The sheer number of vehicles in poorly regulated markets has posed a major challenge for cities and their land use authorities. Despite the fact that increased micromobility–notably cycling–is usually an urban transport policy goal (cf., e.g., Hagen and Rynning, 2021; Pucher et al., 2021), it turns out that many cities are not actually prepared for the large influx of bikes and e-scooters that we have witnessed in recent years. The provision of parking facilities and bike lanes–appropriate for e-scooters as well–has, in most cases, proven insufficient and inadequate. As a result, we see a tendency of rising conflicts between pedestrians, cyclists, e-scooter users and other users of increasingly scarce urban space. E-scooter users may, for example, take to the sidewalks for reasons of traffic safety and accessibility. In this way, shared micromobility has contributed to putting the need for more, and better protected, cycling infrastructure on the political agenda.

Shared micromobility schemes can be docked (station-based), or they can be dockless (free-floating), or a combination of these. Whether a system is docked or dockless has profoundly different impacts on cities, the use of public space, and the need for local government intervention. Regular docked citybike schemes are easily

managed by local authorities. Trips must start and end at designated racks whose location is defined by local authorities. The schemes' opening hours and other codes of behaviour, including pricing policy, are largely determined by a local government. Dockless schemes, on the other side, represent quite the opposite. Trips can start wherever a vehicle can be found and end wherever users desire, as long as it happens within the operator's geographical operating area. That way, dockless systems meet the needs and preferences of their users to a much larger extent than station-based systems. US statistics can serve as evidence for this. While the growth in station-based bike schemes tends to flatten out, free-floating systems of shared micromobility appear to increase exponentially (NACTO, 2020). Also in Norway, more than one in three e-scooter users state that they use the traditional, docked citybike scheme less due to the availability of shared dockless e-scooters (Fearnley et al., 2020b). However, there is wide evidence that unregulated dockless micromobility schemes can create some very particular problems regarding use of public space (Fearnley, 2020). Notable examples include cluttering caused by large numbers of parked e-scooters at central places, on pavements and in front of building entrances, and vehicles thrown into fountains, rivers, parks or ditches. While such visual intrusion in itself is problematic, it threatens the safety and accessibility of others–in particular those with various forms of mobility and sight impairments. On the positive side, dockless schemes tend to serve challenged and low-income communities better than their docked counterparts and thereby improve equity (Meng et al., 2021; Yan et al., 2021).

Motorised, or electric motor-assisted micromobility modes tend to attract slightly different demographies than non-motorised micromobility modes. E-bikes have, for example, proven relatively more popular with elderly and women than traditional bikes (Fyhri et al., 2017; Fyhri and Fearnley, 2015). E-bikes are also used with higher speeds (Flügel et al., 2017).

In several countries, the legal status of micromobility – including helmet requirement, minimum age, access to pavement riding or, as in the UK: an outright ban – depends on whether the micromobility vehicle is motorised. The organisation of shared micromobility schemes is also affected by whether vehicles are motorised. While non-motorised vehicles are typically used for downhill trips and must be rebalanced regularly, shared fleets of motorised and motor-assisted micromobility vehicles require much less such balancing.

This special issue of *Built Environment* investigates how new forms of micromobility impact the city, its land use and transport system, the occupation of space, users and non-users, and the environment. The perspective is international. The contributions cover a full continuum from the early accounts of conflicts and controversies caused by the introduction of new forms of personal mobility devices, to more mature micromobility markets where micromobility, given a right set of policy tools and corporate governance practices, offer solutions to many of the dilemmas associated with urban mobility, social inclusion, public space, and climate change – to name a few.

This special issue starts in Ghana, where traditional bicycles are common but recent micromobility inventions like the (shared) e-scooter do not–yet–dominate cities or their streets. Amoako-Sakyi et al. (2021)'s study predicts that e-scooters and other micromobility modes will have a rough time expanding into Ghana's urban streetscape and transport systems. Their study documents low acceptability to–and even aggression towards–micromobility from local drivers, in a country where traffic accidents are already alarmingly high (Global Road Safety Facility, 2021). Add the fact that e-scooters' accident risk is already very high as compared with bicycling (Fearnley, 2020) and the recipe for calamity can only be avoided by means of broad awareness-building, careful regulation, and enforcement.

Platt (2021) offers a fascinating account of how skateboarders find new uses of, and interactions with, existing urban furniture, spaces and built environment, often to the resentment of their fellow residents. Just like cycling and micromobility are considered illegitimate in Ghana by many drivers (Amoako-Sakyi et al., 2021), skateboarding continues to create conflict over the use of urban space several decades after they first appeared. Platt suggests many ways in which the consideration of skateboarders' needs and preferences can create more interesting urban spaces for all.

The following contribution takes us to the UK and two case studies of the introduction of docked and dockless bicycle hire, respectively. While nicely framed by shared bicycle companies as solutions to achieve transport policy goals at no cost to the public purse, they created a whole new set of challenges to urban local authorities (Dudley et al., 2021). The rise and fall of these services, initially with great promises but subsequent inability to deliver neither financially nor transport-wise, with littering and vandalism as end results in the dockless case, echo the experiences of so many cities worldwide where in particular dockless bikeshare schemes fall between legislative stools and render local authorities in a governance void. When contested, voluntary agreements between bikeshare companies and local authorities are, unfortunately, barely worth the paper they're written on.

Although they acknowledge concerns and limitations regarding shared and privately owned micromobility, the next three contributions are forward looking in the way that they point to ways in which micromobility can be part of the solutions and contribute to urban strategies and goals (Shaheen et al., 2021; Uteng and Uteng, 2021; Sundqvist-Andberg et al., 2021). The paper by Shaheen et al. gives an account of recent shared micromobility history in the US before taking a forward look at dilemmas and, more prominently, opportunities for the future of shared micromobility, which depend heavily on well-founded regulatory and policy actions. Uteng and Uteng's paper combines land use analysis with the potential accessibility gains of e-bikes. With two Norwegian case studies, it shows how e-bikes can increase job accessibility, and especially so in areas that surround city centres. This effect can be amplified with supporting transport and land use policies of, e.g. bicycle lanes, speed limits, and densification and transformation of such areas. Sundqvist-Andberg et al.'s paper analyses, in combination, the sustainability performance of the urban transport system and the sustainability of Finnish e-scooter service providers' business models. The emphasis is on the latter, i.e. the degree to which sustainability is an integral part e-scooter companies' business model. Although Finnish cities' legal

toolbox is limited, they find that e-scooter companies have incorporated several elements of sustainability into their business models, although their perspective is rarely the entire urban transport system. As several of this Special Issue's contributions highlight, the importance of (co-)regulation in order to stimulate benefits and innovation, while at the same time attending to other societal goals, is emphasised. Where a city's legal powers to regulate the market for shared micromobility are weak (or lacking), much can be achieved with active and two-way dialogue between city authorities and shared micromobility provides.

Micromobility offers many desirable potential benefits but also some pitfalls. Outcomes depend crucially on how local and national governments *regulate* in order to address problematic side-effects and *facilitate* in order to realise the benefits. Land use and transport are deeply intertwined policy areas. For urban micromobility, this is even more so.

The future of micromobility is partly unknown. Bicycles, skateboards and e-scooters are undoubtedly here to stay. But new technologies, vehicles and business models will inevitably emerge and disrupt urban mobility also in the future. Also then, governments at all levels must be proactive, flexible and facilitative in order to achieve wider goals for transport, society and climate. The role of micromobility in a multimodal transport future must be maintained and promoted.

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