# How can Gender Smart Mobility Become a More Intersectional Form of Mobility Justice

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**Abstract:** This paper discusses ethical issues relating to equity in smart mobility (SM) with a focus on the intersections of gender, race and class. The H2020 TInnGO (Transport and Innovation Gender Observatory) project, in which this work was undertaken, was built around the concept that Gender Smart Mobility (GSM) requires not just the development of smart mobility but the application of gender and diversity mainstreaming. The paper is set against a background of slow but steady progress towards gender equality in transport, where women in the EU now account for between 22-27% of the transport workforce, and their multimodal journeys are underserved by current transport provision. Gender and diversity mainstreaming recognises the importance of applying intersectionality in creating fair and equitable transport services which can reduce the vulnerability of certain groups to social-exclusion related transport poverty. Although championed by the EU as an objective of transport policy, Gender Mainstreaming (GM) has had limited uptake at national level and has been criticised for its oversimplification of gender, and prioritisation of gender over other factors. Incorporating intersectionality into transport policy can build on advances already made by GM However little work has been conducted in this area. Therefore, we have discussed how an intersectionality-based policy analysis framework used in health can be applied to this area. The paper argues for wider use of intersectionality (i.e., gender and diversity mainstreaming) in the SM sector and how it can be operationalised to create more equitable transport and societies. The discussion is timely given the disproportionate impact of COVID-19.

**Keywords:** intersectionality, mobility justice, transport poverty, smart mobility, social exclusion

## 1. Introduction

The advancement of women and transport, as both users and employees has progressed slowly over the past 20 years, with women still only accounting for between 22-27% of the transport workforce in the European Union. This fact is of key importance when considering mobility justice.

Transport facilitates access to the labour market, healthcare, recreational and education systems and families. An integrated, fair and accessible transport system is therefore key to social economic development and social justice. Unfortunately transport planning (and the wider Transport Business Ecosystem (TBE)) has tended to focus on the efficient movement of vehicles and the needs of the primary wage earner. As such those from already economically disadvantaged groups - including women, elderly, people from BAME (Black, Asian, Minority and Ethnic) and LGBTQI+ communities, those with disabilities and on low incomes – are not served by current transport provisions. Research conducted by the Horizon Europe 2020 TInnGO (Transport Innovation Gender Observatory) project[1] estimated current transport provision only met the needs of a third of EU citizens (Lynce, et al, 2021). For example, owing to gendered roles in society women take on most household, caring and nurturing duties, even if they are in paid employment. As such their transport needs differ from those of men – they may make shorter, and more frequent journeys, spatially and geographically limited based on the demand of their nonpaid roles (Maffi, Malgieri, and Di Bartoli, 2018). Until recently such 'non-work' related journeys (undertaken primarily by women) were not even measured or regarded by transport planning. They simply did not count in a service geared towards serving the principal wage earner and city centres.

This is compounded by the lack of gender and ethnic diversity in the transport workforce, with only 22-27% of women employed in the sector (E.C.2020), usually at lower grades, most of whom can point to, or have experienced gender discrimination. The Transport Business Ecosystem (TBE) is still dominated by white, middle-class, middle-aged men, graduating from STEM disciplines (which are themselves male dominated) who may have little knowledge, understanding or empathy with those from different groups and their travel needs. Workforce diversity is key to developing in-house champions and developing a tacit understanding of end user

[1] https://www.tinngo.eu/

needs. This becomes a power and social justice issue. Sex disaggregated data can show who uses which modes of transport and even where transport systems fail (see Lynce et al, 2021); solutions and recommendations can be made (e.g., for more lighting, better trained staff) and gender and diversity mainstreaming tools used to create gender and diversity sensitive form of mobility, and Key Performance Indicators for organisational change. These have been shown to be effective, but only if there is a will to change and consider transport as a mobility service, serving the needs of all citizens.

## 2. Smart city and smart mobility objectives

A smart city is one which integrates ICT (Information and Communication Technology) to collect data and connect devices to optimize the efficiency of city operations and services and connect to citizens. This is not a static process, but a series of steps through which cities may become more liveable and resilient. It has been driven by a technology push, with companies rapidly seeking new markets for their technologies, by city administrations simultaneously seeking ways to do more with less through technical solutions given austerity cuts, and to attract investment and boost local economies and a neoliberal political economy that promotes the marketisation and privatisation of city services (Kitchen et al, 2018).

The approach has been criticized for the way it frames the city as a series of systems rather than places; its technological solutionist approach; enacts technocratic forms of governance and reshapes governmentality; promotion of corporatisation and privatisation of city services; prioritisation of the values and investments of vested interests; reinforces inequalities; uses surveillance, predictive profiling, social sorting and behavioural nudging; and potentially creates security vulnerabilities across critical infrastructures (Kitchen et al, 2018). Research (eg Masucci et al 2020) already suggests that emergent smart cities reproduce actual as well as perceived urban inequities Wealthy residential neighbourhoods and spaces become “smart,” but much of the city remains left behind.

Smart mobility is postulated as a means of accomplishing zero emissions, zero accidents, and zero ownership. It was originally built around the principles of flexibility, efficiency, integration, clean technology and safety. These principles have been expanded to include accessibility and social benefit, i.e. it should be affordable for everyone and help provide a better quality of life. These latter principals were not at the heart of the original proposals, which were based solely around STEM and ICT, again reflecting a technological rather than social justice orientation.

In line with Lefebvre (1996) TInnGO has argued that a smart city cannot be smart if it leaves people behind and is not founded on social justice and equity. It should be a space that is shaped according to the inhabitants needs allowing all citizens to fully enjoy urban life with all of its services and advantages and to take a roll in its planning.

Smart city technologies raise a number of ethical issues concerning privacy, datafication, dataveillance and geo-surveillance, profiling, social sorting, anticipatory governance, and nudging, that have significant consequence for how citizens are conceived and treated (e.g., as data points; subjects to be actively managed and policed; as consumers) and can work to reproduce and reinforce inequalities (Kitchin, 2016; Taylor *et al.*, 2016). All of these are widely used in SM e.g., in pilot trials of shared and e-biking, smart motorways and variable signage.

To achieve smart mobility targets, smart cities have opened themselves up to technology providers which erode privacy on a number of levels; e.g. geo-location tracking which erodes movement privacy (Kitchin, 2016; Leszczynski, 2017), remote controllable digital CCTV cameras that can track individual pedestrians, increasingly aided by facial and gait recognition software, inductive loops, traffic cameras, and automatic number plate recognition cameras monitoring road networks, sensor networks on street infrastructure such as bins and lampposts to capture and track phone identifiers. The connected city routinely collects socio demographic data from smart phones and smart cards, analysing and sharing data, and ultimately profiling and nudging behaviours of certain groups or individuals. Data determinism is not necessarily benign. Within smart city paradigms ‘the citizen is framed within the smart city: as a data-point, a targeted consumer, a user, an investor, a sorted individual, and a surveilled, controlled and policed subject’ (Kitchin, 2018, p11).

Smart cities serve the ‘general citizen’ (white, male, heterosexual, able bodied and middle class), not the ‘absent’ one (referring to all those diverse communities that hold differing identities, values, concerns and experiences). This clearly reflects those at senior levels in the sector and inventors. They may be guided by a small minority of

active, entrepreneurial citizen that builds civic tech for community development through hackathons and other events (Joss *et al.*, 2017; Townsend, 2013). However, the participatory and inclusive nature of these events remains questionable.

Over the last 10 years, and across 3 EU funded projects, Woodcock has reported on the lack of inclusivity, meaningful engagement and participation of citizens in transport surveys and transport planning. Disadvantaged groups are still seen 'as difficult to reach', even when as a group, they may form the largest population in a city, and when many tools and recommendations are available (e.g., through CIVITAS, ELTIS) to support true levels of participation.

Smart Mobility (SM) is posited as means of delivering key benefits such as a reduction in pollution, congestion, noise and costs, whilst at the same time increasing safety and improving transfer speed. It is marketed as part of a future in which mobility becomes a personalised, on demand service with greater consumer choice and new models of ownership. However, our analysis of visual representations shows that SM future is technology led and exclusionary (Christensen et al, 2021)

This is unsurprising given that SM's roots are STEM subjects such as computing, engineering, manufacturing and planning where gender imbalances are significant and pervasive (Harrison, 2012; Hutchinson & Bentley, 2011; Pirra et al, 2020). Worryingly, a gender gap has already been recognised in the UK and Nordic regions (Singh, 2019). Predominantly demographic studies of SM systems reveal that most users are young, male and have higher incomes (Singh, 2019). SM entrants, such bike sharing and e-scooters, are not equipped for women or those with caring commitments, who may require child seats and storage for shopping. These groups are already excluded as the developers have focussed on early adopters. Equally SM relies heavily on the use of technology, using apps to access services which requires a level of digital literacy and ownership of the required technology. Such systems may be beyond the reach certain demographics, such as those on low incomes and the elderly. So, whilst SM is advancing choice and offering more sustainable modes of transport it is not clear whether these advancements will be advantageous to all groups in society and highlights a need for a deeper understanding of users differing needs and abilities. Intersectionality as a tool for SM policy makers.

If left unchecked, this may not only limit the opportunities for women's employment and education in this new field but may also impact the type and inclusivity of future development in Smart Mobility innovations.

## 3. Social justice and mobility justice

Social justice relates to the fair treatment of people in particular circumstances and how people should act (Smith, 1994). In relation to smart mobility, we would argue from a feminist perspective for an end to practices of discrimination and a redistribution of power relations so that citizens have a much stronger say in how such systems work and receive fair treatment.

Gender relevant aspects of a smart city - mobility, safety and security, employment and sustainability - have been identified as fields of action for the EU. However, progress is slow, impeded by lack of willingness and ability to adopt measures that would create a fairer system.

Mobility justice (Sheller, 2018) refers to efforts to shed light on the vulnerabilities that different individuals face as they travel. It offers a new way to think across the micro (as inflected by race, gender, disability, and sexuality), meso, and macro scales of transitioning toward more just mobilities. It stands in opposition to transport justice, providing an opportunity to focus on the organization of power around systems of governing mobility and immobility at various scales. In light of the discussions in the previous sections there is a clear issue around control of the smart mobility sector (TBE) and how control of mobility and the power of certain groups to influence/choose their mobility is being played out. In the next section we propose using intersectionality as a means of addressing these challenges.

## 4. Intersectionality

Intersectionality, rooted in black feminism and post-colonial theory posits that lives cannot be reduced to single characteristics, and experiences cannot be understood accurately when one single factor is prioritised (Hankivsky et al., 2014). Intersectionality describes micro level processes; how individuals and groups occupy a position using interlocking structures of oppression (Dressel et al.,1997). The interconnection of these structures

creates intersectional disadvantage, defined here as the interconnected nature of categorisations including (but not limited to) gender, race, class, disability, faith and age and how different power structures interact, creating an interdependent system of discrimination and disadvantage

Mobility Justice (Sheller, 2018), Transport Justice (Martens, 2016) and Transport Poverty (Lucas et al, 2016) are all terms that serve to understand the disparities in mobility and accessibility for citizens from disadvantaged backgrounds. Intersectionality can be used to explore the relationship of the overlapping nature of identity characteristics to mobility. We are focussing attention on the intersections of gender, race and class in this paper, but discussions are of equal relevance to other intersectional characteristics such as disability, faith and sexuality.

Intersectionality can advance the understanding of gender and transport through the inclusion of additional characteristics to show that transport needs depend on age, race, income and location. It can identify the interconnected nature of multiple factors that lead to diversities within groups i.e., women - and their travel behaviours, choice of transport mode and the barriers faced in access to transport.

Transport related social exclusion is a pervasive issue that has a significant impact for certain groups in society, i.e., disabled, elderly, low-income families, and women. (Lucas, 2012). Extensive literature has investigated the differential impacts of poor accessibility experienced by disadvantaged groups (SEU, 2003; Titheridge, et al.,2014) and identified the socio demographic effect related to personal characteristics. As illustrated by Jones and Lucas (2012), the micro individual oppressions of social groups vulnerable to accessibility (such as those without cars, disabled and older groups). interact with macro level issues (inadequate transport and other local services) and those at the meso level, stemming from (inter)national trends (restructuring of global markets, laws, cultural influences). Social exclusion is a constraints-based process which causes individuals or groups to be unable to participate in the normal activities of the society in which they are resident and has important spatial manifestations (Preston and Rajé, 2007). All transport modes other than walking typically incur cost, with faster modes such as cars or trains incurring higher cost than slower more sustainable forms of transport, but access to faster modes offers access to wider opportunities within a given time. Transport systems should be designed to alleviate poverty and enable all citizens to access the places they need to. Titheridge et al (2014) recommended that in order to achieve such aspirations equity criteria need to be developed and implemented to ensure that those marginalised in society have their needs met. The incorporation of an intersectional consideration could improve the understanding of differing needs and enable more targeted approaches to improving mobility and accessibility.

## 5. Transport policy

We are mindful of the substantive progress made by scholars in the field to address gender equality in transport policy (Hamilton et al.,2005; Polk, 2008) and of the adoption of gender mainstreaming into policy at an international level. However, adopting a policy approach with a singular focus i.e., issues of gender, leads to false classifications and oversimplifications that do not accurately reflect lived experience. Similarly using an additive approach (Hancock, 2007) where different characteristics are added to another does not address the interplay between characteristics such as inequality and discrimination. Adopting an intersectional or diversity mainstreaming approach to transport policy can become a smarter form of mobility justice.

To do this the work of academics (such as Levin & Faith-Ell, 2019; Polk, 2008; Roemer Christiansen et al, 2007; Breengaard, et al.) should be used to incorporate gender mainstreaming into European transport policy. Following the inequalities revealed in the pandemic, adopting an intersectional or diversity mainstreaming approach to transport policy can enable gender smart mobility to become a smarter form of mobility justice.

## 6. Gender mainstreaming

The concept of Gender Mainstreaming (GM) was defined in 1997 by the ECOSOC (UNWomen, 2020) as a strategy for making women's as well as men's concerns an integral dimension at all levels of policy. As such GM has been adopted in transport policy at the international and European level (EIGE, 2020). However, GM has not been applied well at a national level with only Sweden and the Nordic regions showing a history of incorporating GM and gender equality goals into public policy and gender equality is an objective in all policies (Polk, 2008). Similarly, in Austria GM has been embedded in planning and policy design (Telepak: SUMP Network-EU Vienna, 2014).

GM has been criticised for singling out gender as the primary category for equality. It not only fails to recognise diversity among men and women but as Hankivsky (p 218, 2011) argues it perpetuates the additive approach where differences are added to the variable of gender which subsequently reinforces the privilege of certain groups. In Austria the use of the word gender in the context of urban planning and policy has been shown to reinforce stereotypes when considering how to characterise differences between how men and women use space. This has led to the use of the term *Fair Shared City* (Irschik and Kail, 2013). GM has also struggled to become adopted in developing countries where gender blind organisational leadership has meant a weak commitment to gender equality. Although, GM can significantly advance gender parity in transport policy, the concept is largely Eurocentric and the non-standardised approach to uptake has led to a fragmented response particularly to tackling gender, diversity and racial inequality which makes it difficult to assess what progress had been made. In its acknowledgement of these issues, the TInnGO project moved its emphasis away from Gender Action Planning and Gender Mainstreaming to Gender and Diversity Action Plans and Gender and Diversity Mainstreaming, and developed a set of operational tools and methods to support transport stakeholders in developing actions to reduce inequalities,

## 7. Delivering gender smart mobility

Intersectionality based policy analysis (IBPA) is a relatively new line of inquiry but has been well researched in the health literature (Viruell-Fuentes et al, 2012; Hankivsky, 2012; Bowleg, 2012). Its nonlinear approach offers greater flexibility in consideration of the context of place and diversity (Hancock, 2007) with the relationship between identity categories considered as an open empirical question, free from the assumption that any category or intersection deserves 'a priori' status.

'IBPA is intended to capture and respond to the multi-level interacting social locations, forces, factors and power structures that shape and influence human life and health. Its aim as a policy tool is to better illuminate how policy constructs individuals' and groups' relative power and privileges vis-à-vis their socio-economic-political status, health and well-being' (Hankivsky et.al, 2014). Various intersectional policy frameworks have been developed (Hankivsky et.al, 2014; Davaki et al., 2013) for health, gender and disability policy, which could be applied to smart mobility policy if used in conjunction with research on transport inequality (NatCen, 2019; Crisp, et al, 2018; Lucas, et al., 2018). Hankivsky et al's model comprises two core components: a set of 8 guiding principles based on intersecting categories, multi-level analysis, power, reflexivity, time and space, diverse knowledges, social justice and equity and 12 overarching questions (as shown in Table 1 below) to help develop the analysis; both sections are designed to be used in conjunction with each other.

Table 1: Descriptive and transformative overarching questions of IBPA (Hankivsky et.al, 2014)

| | |
|---|---|
| **Descriptive** | What knowledge, values and experiences do you bring to this area of policy analysis? |
| | What is the policy problem under consideration? |
| | How have representations to the problem come about? |
| | How are groups differentially affected by the representation of this problem? |
| | What are the current policy responses to the problem? |
| **Transformative** | What inequities actually exists in relation to the problem? |
| | Where and how can interventions be made to improve the problem? |
| | What are feasible short- and long-term solutions? |
| | How will the proposed policy responses reduce inequities? |
| | How will implementation and uptake be assured? |
| | How will you know if inequities have been reduced? |
| | How has the process of engaging in an intersectionality – based policy analysis transformed<br>Your thinking about relations and structures of power and inequity<br>The ways in which you are others engage in the work of policy development, implementation and evaluation<br>Broader conceptualisations, reflections and effects of power asymmetry in the everyday world |

When comparing the Intersectional framework questions to transport inequality reports it is clear there are significant similarities, each relate to Power, Social Justice and Equity together with intersecting characteristics such as (but not limited to) gender, race and class. We are of the opinion that when developing policies for

smart mobility both topics of transport inequality and intersectionality should be at the fore front of the design process in order to develop more inclusive diversity mainstreaming policies.

## 8. Conclusion

In this paper we have discussed how SM could be a more intersectional form of mobility justice. Significant advances have been made over the last 20 years in the adoption of GM in transport policy, however the progress of women in the transport sector both as employees and as transport users has not kept up with this progress. Even when gender equality is enshrined in law this does not appear to be a tangible reality for many women. EU policy has adopted GM as a policy objective with intersectionality as a horizontal principle, however there is no reference to how this can be achieved.

It must be noted that there are limitations to adopting this approach. Intersectionality is complicated and requires expertise; further research should be undertaken to develop tools that can measure the simultaneous effects of intersections and equity in transport. One way could start with the collection of disaggregated data, the quality of data will provide the foundations for thorough intersectional analysis. Novel forms of data, using innovative methods of data collection and grater inclusion of qualitative inquiry would also better reflect the lived experience of citizens. It is important also to note that Intersectionality analysis focuses on the axes of oppression and power. Challenging established structures of power requires policy makers to develop new ways of thinking and there may be resistance to change. However intersectional analysis offers an opportunity for debate about how differences relating to (but not limited to) age, gender, race, income and ability can influence how mobility is experienced and factors such as safety and risk for women and diverse groups can be better understood.

## Acknowledgements

This paper received funding from the European Union Horizon 2020 Research and Innovation programme TinnGo project under grant agreement no 824349.

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