

Applying a multi-level perspective to examine the potential transition to an accessibility-based approach to transport planning: Insights from cities in Sweden, Kenya and South Africa

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Abstract

There is a growing acknowledgement among transport planning scholars that the traditional, mobility-focused approach has created futures with undesired, unintended characteristics. A paradigm shift regarding the fundamental premise of transport planning is being proposed. Accessibility-based planning involves shifting the focus from speed to access, from the system to the user, and from efficiency to equity. In order to examine the potential transition to an accessibility-based approach to transport planning, this paper applies the Multi-Level Perspective to three cities: Cape Town, South Africa; Gothenburg, Sweden and Kisumu, Kenya. The paper builds on the perspective that conceptualises changes in large-scale, interdependent urban systems as a *gradual system reconfiguration*, rather than a sudden disruption by a niche-innovation. The paper proposes that, due to the concept of accessibility being a common language between transport planning, spatial planning and public finance, a nested regime structure is valuable. The whole system reconfiguration approach provides the ability to address the multiple landscape dynamics, multiple niche-innovations and multiple interdependent regimes of an accessibility system. To provide insight into the functioning of these accessibility regimes, initiative-based learning was conducted through an examination of planned rail projects in each city in collaboration with practitioners, decision-makers and stakeholders. In Gothenburg, the policymakers have an advanced understanding of transport justice and access equity, but the consumers continue to demand suburban housing and car-based mobility opportunities. In Kisumu, the paratransit (informal public transport) regime is well-attuned to the differential accessibility needs of the communities that it serves, but it still relies on the infrastructure provided by government entities with very narrow perspectives on mobility. In Cape Town, the disparity in the transition seems to be between policy and implementation. Many of the actors within the regime are calling for a more equitable distribution of access in the city. However, the budget allocation still favours road infrastructure and BRT expansion over salvaging the rapidly deteriorating rail system and supporting the burgeoning paratransit industry. The differential pace of transition by different actors within the accessibility regime of each city could create as much tension within the regime as the landscape challenges, opening up 'windows of opportunity' for the laggard actors to be disrupted. This paper shows some of the value of bringing together the fields of urban planning, engineering and socio-technical transitions to better understand complex urban systems and their related governance challenges.

Key words: Accessibility, Sustainability transitions, Multi-level perspective, Transport justice, Transport planning

Introduction

Transport planning theory has undergone significant transformation over the past decades and practice looks primed to follow suit. There has been an increasing recognition that the modernist, ‘predict-and-provide’ techniques for transport planning and their mechanistic, positivist approaches to optimisation has produced many undesirable, unintended futures (Goodwin et al., 1991, Owens, 1995, Graham & Marvin, 2001, Venter). These techniques foregrounded technological advances in transport vehicles, road design and infrastructure, leading to the isolation of the profession from the other urban sciences (Graham & Marvin, 2001). The culmination of this evolutionary line of transport planning was the domination of most public space by the automobile in many cities of the Global North (Rode, 2018).

To break from this evolutionary path, transport planning scholars revisited the fundamental premise of urban passenger transport. The traditional, mobility perspective centres movement between two points in space as the *raison d'être* for transport systems and the profession as a whole. However, the movement through space usually provides little utility to the users of a transport system. Transport demand derives from the desire for a good, activity or experience that isn't available within proximity of the user; it is a derived demand. The extent to which a combined land use-transport system enables an individual to reach a desired activity or destination—or a company to reach individuals—by means of a transport mode is called accessibility (Van Wee, Annema & Banister, 2013).

The support for accessibility as a planning premise has grown significantly in the past few years, but this emergence has largely remained confined to academia (Gutman et al., 2017). Golub & Martens (2014:1) propose that accessibility is “the most appropriate measure of benefits from transportation plans and investments, and thus should be the focus of any effort

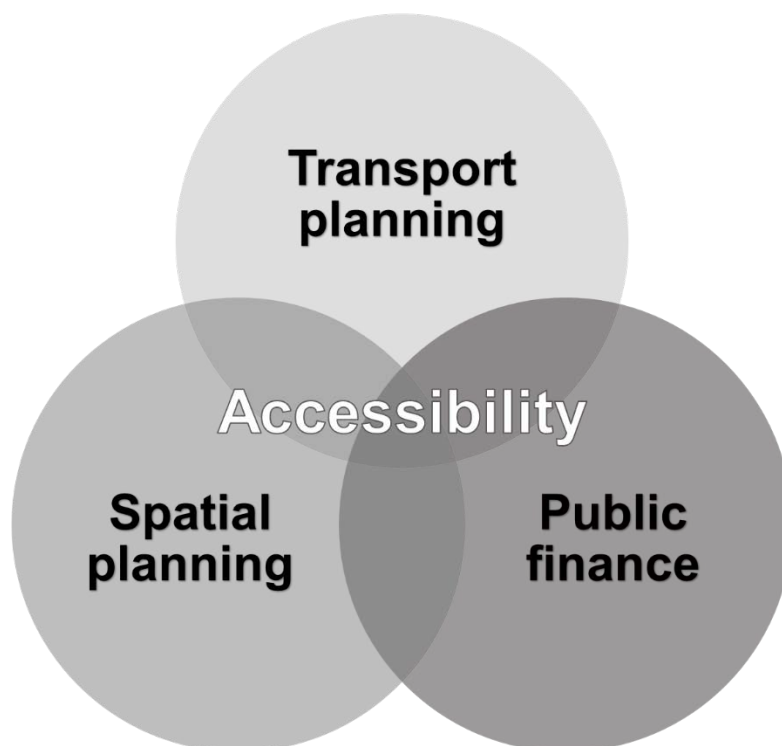


Figure 1: Conceptualisation of accessibility as a transdisciplinary medium

Adapted from Gutman et al. (2017)

to understand and measure the impacts of transportation investment programs.” To take this proposition further, Martens (2016) introduced a framework for transport investment based on the notion of an equitable distribution of accessibility among the users of the system, called ‘transport justice’. This approach focuses on the strategic allocation of transport investments and programmes to target ‘access poverty’ (Golub & Martens, 2014). A poverty of access is defined as an unacceptable difficulty in reaching key opportunities and services within a reasonable ease, time and cost (Lucas et al., 2016). There are many factors that affect a user’s level of access, see Litman (2015), but chief among them are the demographic characteristics of the user (age, gender, income etc.) and the distribution of land uses or activities that the user is trying to access (Geurs & van Wee, 2004).

Figure 1 illustrates that accessibility is a common language between transport planning, spatial planning and municipal finance. The traditional transport planning approach, and its emphasis on operational optimisation as a solution to access challenges, has isolated the field from the other urban sciences (Rode, 2018). In contrast, accessibility-focused transport planning is an inherently transdisciplinary approach. Shifting the transport sector toward a future that prioritises access over mobility and equity over efficiency will require fundamental changes that are both structural and systemic in nature.

Research around how to initiate or guide this paradigm shift to accessibility-based planning policies and techniques at the practitioner level remains in its infancy. This can be seen in the current interpretations of SDG 11.2, that access to public transport, through proximity, is the appropriate metric for success rather than the level of accessibility that the public transport can provide each user (Brussel et al. 2019). This interpretation, and the wording of SDG 11.2, are undermining the paradigm shift that is being proposed. This transition from modernist, ‘predict-and-provide’ transport planning approaches to interdisciplinary, equity-driven accessibility approaches requires a robust framework for managing the complexity and uncertainty of this systemic change. The value of a systemic change framework, necessary to achieve a more sustainable future, is not unique to the transport sector, and has, in part, given rise to the research field of ‘sustainability transitions’ (Canitez, 2019).

Accessibility in transition

Transport systems are not a new focus for transition researchers, but transition theories and frameworks are still nascent among transport planning researchers. In a literature review regarding the transition of mobility planning towards sustainability, Nikulina et al. (2019) found that the transport planning and transition scholars have distinct, separate epistemic communities that are seemingly not collaborating. Only one of the 444 publications they reviewed mentioned planning for transitions (Nikulina et al., 2019).

In the application of transition theories to transport systems, transition scholars have primarily focused on analyses of the past, see Geels (2002, 2005). What these historic analyses of transport mode transitions have shown is that the frameworks are effective in exploring the complex rationale of these transitions and, in part, explaining how the ST-regimes in these transport sectors came to be dominant (Nykqvist & Whitmarsh, 2008). In contrast, planning scholars typically look forward, favouring long-term-focused visioning, backcasting and scenario planning (Nikulina et al., 2019). Some transition scholars have taken similar

approaches, with Elzen et al. (2002, 2005); Kemp & Rotmans, 2004 and Geels & Schot, 2007) all analysing future transport mode shift and technological change scenarios.

The applications of transition theory to transport systems have helped explain rise, stability and decline of existing and previously dominant regimes. However, Temenos et al. (2017) highlight that despite transition theorists believing that transitions involve significant change to almost all of the components of a regime, the empirical research tends to focus on technological change (fuel, vehicles, infrastructure, ICT) to the detriment of the other components. Changes related to the cultural regime, such as an increasing focus on equity, and the science regime, such as planning processes premised on accessibility, receive far less attention or are addressed indirectly. The ability of transitions theory to incorporate changes to the more complex and uncertain components of a regime is among its most valuable traits, yet the opportunity to do so regarding transport systems remains largely untaken (Temenos et al., 2017).

This preliminary analysis aims to combine research trends and approaches from both epistemic communities. A Multi-Level Perspective (MLP) is conducted on the accessibility regime of each of the three cities. The purpose is to examine the historic developments in each system, drawing insights about their transition pathways to a more or less just provision of access. The method expands upon the MLP approach used by Geels (2018), in their study of passenger mobility transitions in Great Britain. The extensions to the MLP logic that Geels (2018) proposed for that study reflect the specific challenges in understanding mobility or access regime transitions. Rather than an approach that 'zooms in' to a particular innovation, the study 'zooms out' to analyse the system as a whole, an important, but understudied topic (Geels, 2018). Geels (2018) acknowledges that transition within the mobility regime is more likely to be gradual system reconfiguration than any one singular disruption. Extensions to the MLP include the analysis of multiple landscape dynamics and multiple niche-innovations that variably influence the multiple regimes that make up the mobility system. This whole system perspective aligns more closely with integrated land use-transport and accessibility planning approaches, which will ideally lead to a greater cross-pollination of ideas.

The paper will also explore what stage of development the concept of equitable access or transport justice occupies in each city. The MLP framework allows an explorative comparison of the perspectives on accessibility from different actors within each city. To assist in understanding these perspectives, the study bridges analytical approaches by including initiative-based learning from practitioners in each of the city governments (Geels & Berkhout, 2016). Each city happens to be in the process of planning a major rail initiative, which presented itself as an opportunity to examine and compare perspectives on accessibility across very different contexts.

Case studies

Accessibility regimes are complex networks of actors spanning multiple sectors, disciplines and scales. Geels (2018) examines the techno-economic developments of the mobility regime of Great Britain and divides the various actors into four social groups (firms, consumers, policymakers, wider publics). The case studies have followed a similar method, with the addition of the insights from the rail initiatives being planned in each city.

Cape Town, South Africa

Landscape pressures

South African cities went through a period of intense urbanisation after the advent of democracy in 1994 and the abolition of Apartheid restrictions on the freedom of movement. Cape Town, the country's second largest city, increased in population from 2.5 million in 1996 to 4.2 million in 2017 (City of Cape Town, 2012; 2018). This period saw a strong trend toward suburbanisation by the wealthy around existing economic nodes and vast low-income settlements developing on the cheaper land at the urban periphery. This trend, coupled with the Apartheid legacy of the forced relocation of working-class families from the older, better located neighbourhoods, has exacerbated the spatial dislocation of the majority of residents from the available opportunities and services in the historic economic nodes (Visser, 2001). In recent years, wealth has begun returning to the inner suburbs and gentrification is gaining momentum, which could further intensify the disparity in the distribution of access (Lees, Shin & López-Morales, 2015; Hwang & Sampson, 2014). The spatial fragmentation, long travel distances and access inequity that most residents of Cape Town endure have highlighted the flaws in the traditional, mobility-focused planning techniques used in the city. Due to Apartheid spatial planning, the land use system in Cape Town has not been able to provide access through proximity for most of its residents (City of Cape Town, 2017). Hence, access is largely dependent on mobility. The spatial fragmentation of the city has also had significant, negative effects on the operational efficiency of this system; undermining its financial viability and restricting the city's ability to finance the necessary improvements in accessibility. The national and local governments of South Africa have pledged to transform the urban form of their cities to reduce segregation and access inequity but lack a holistic framework to guide them toward transport justice. Figure 2 portrays these landscape challenges in a modified MLP of Cape Town's accessibility system.

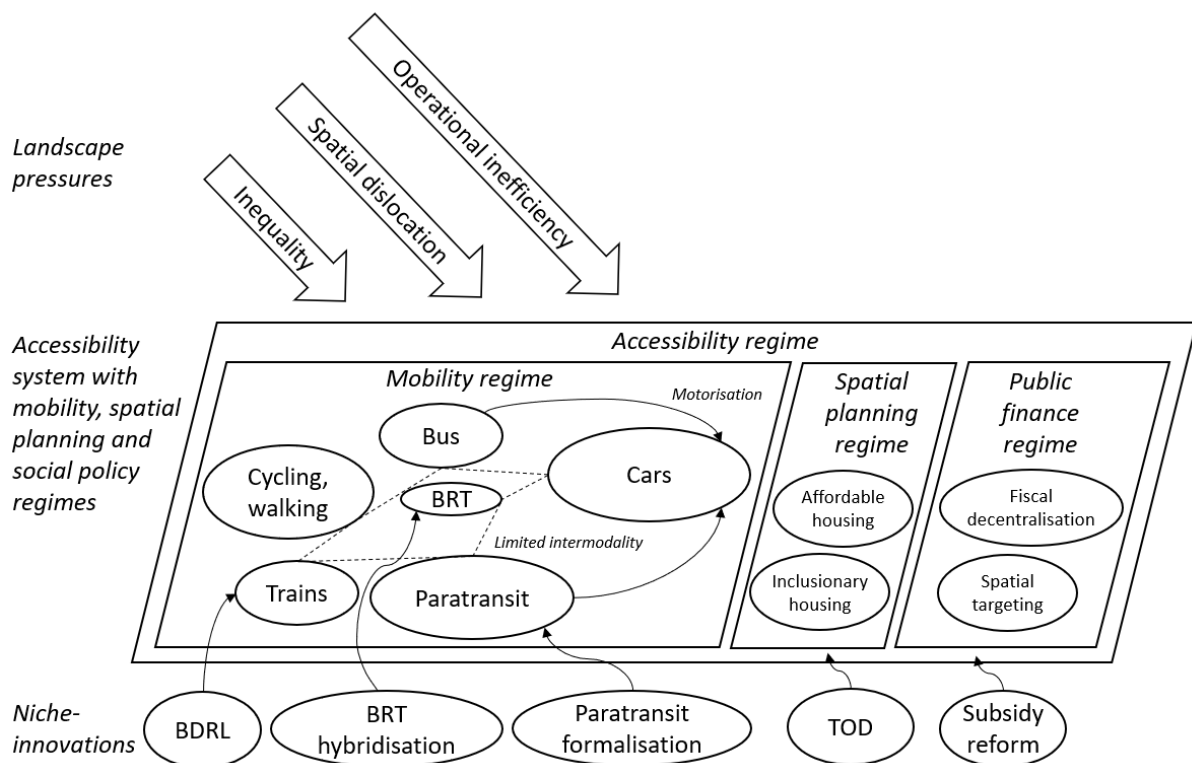


Figure 2: MLP-conceptualisation of accessibility system configuration in Cape Town

Adapted from Geels (2018)

Socio-technical regime

Techno-economic developments

Cape Town's accessibility regime has undergone significant change since the advent of democracy. The formal bus and rail networks, legacies of the Apartheid mobility system, have been hindered by aging infrastructure and underinvestment. Rail usage in Cape Town has halved in recent years due to a lack of rolling stock and low reliability (Transport and Urban Development Authority, 2017). Paratransit, informal public transport services, proliferated to cater to the increasing demand and decreasing supply of access by bus and rail. The paratransit industry conveyed 66% of all daily public transport trips in South Africa's six largest cities in 2014 (Hunter Van Ryneveld, 2014). The leverage that the state has over this industry to specifically target access improvements remains limited as their operations are not actively controlled nor subsidised.

Hence, during the 2000s, the prevailing perspective was that the industry needed to be formalised or replaced by a niche-innovation that emerged at the time, Bus Rapid Transit (BRT) (Department of Transport (RSA), 2007). Initial financial modelling, based on Latin American examples, suggested that BRT services would also be subsidy-free in their operation and significant capital resources were allocated to dedicated infrastructure within the city (Transport for Cape Town, 2015). However, the spatial dislocation within the city, and related operational inefficiency, has overwhelmed any technological advantage that BRT claimed to possess over paratransit and the services have proven to be financially unviable (Del Mistro & Bruun, 2012; Seftel & Peterson, 2014). Consequently, recent plans call for the slower transition of the paratransit industry to a new, hybrid system, through the incremental introduction of BRT characteristics to existing services (Transport and Urban Development Authority, 2017).

Actors and institutions

1. Industry/firms

The firms operating within Cape Town's accessibility regime consist of a fractured landscape of state and non-state actors. Spatial planning is coordinated by the local government, but state housing in the city is provided by both local and provincial governments (Transport and Urban Development Authority, 2018). Transport planning is within the local government's mandate and it contracts BRT services on the dedicated infrastructure, under its ownership (Transport for Cape Town, 2015). However, conventional bus services are contracted by the provincial government, and the rail system is owned and operated by a national government entity (Transport and Urban Development Authority, 2017). Paratransit services are licenced by the local government but primarily self-regulated through collective 'associations'. Roads in the city are owned by local, provincial or national government depending on their function.

2. Consumers

For most residents, access is provided by the public transport system, as low incomes have limited private vehicle ownership. Paratransit use continues to increase due to the operational issues faced by the rail, bus and BRT networks. As paratransit services are provided without subsidisation, and do not benefit from the economies of scale, they remain more expensive for the urban poor than most rail and bus services. Consequently, the average household in the bottom income quartile in Cape Town spends 27% of their income on transport to employment (City of Cape Town, 2014).

3. Policymakers

The policymakers in Cape Town have not explicitly named accessibility as a focus but have highlighted spatial dislocation and transport affordability as key challenges to address through integrated planning. In 2016, the City posited Transit-Oriented Development (TOD) as a viable approach to sustainably finance access improvements. Simultaneously, national and local government departments have proposed that TOD could create more viable and affordable public transport services by increasing the efficiency of the public transport demand patterns (City of Johannesburg, 2013; City of Cape Town, 2016; Republic of South Africa, 2016; Venter, 2016). Cape Town's TOD approach does not reference equity or accessibility specifically, but it does allude to the alignment of transport, spatial planning and social objectives, which underpins accessibility-based planning. A strategy that does reference equity and accessibility more directly is the draft inclusionary housing policy, that aims to create housing opportunities in well-located suburbs for low income residents (City of Cape Town, 2019). An initiative to provide free travel to employment seekers on the City's BRT network during off-peak hours also speaks to the transport justice principle of prioritising those with the least access (MyCiti.org.za, 2017).

4. Public discourse

Accessibility-based planning and transport justice are yet to enter the public discourse in the form of these terms, but their principles of equity, capability and sufficiency have become staples in Cape Town's public debates. Public advocacy groups, such as Reclaim The City, the Social Justice Coalition and Ndifuna Ukwazi, have foregrounded spatial justice, well-

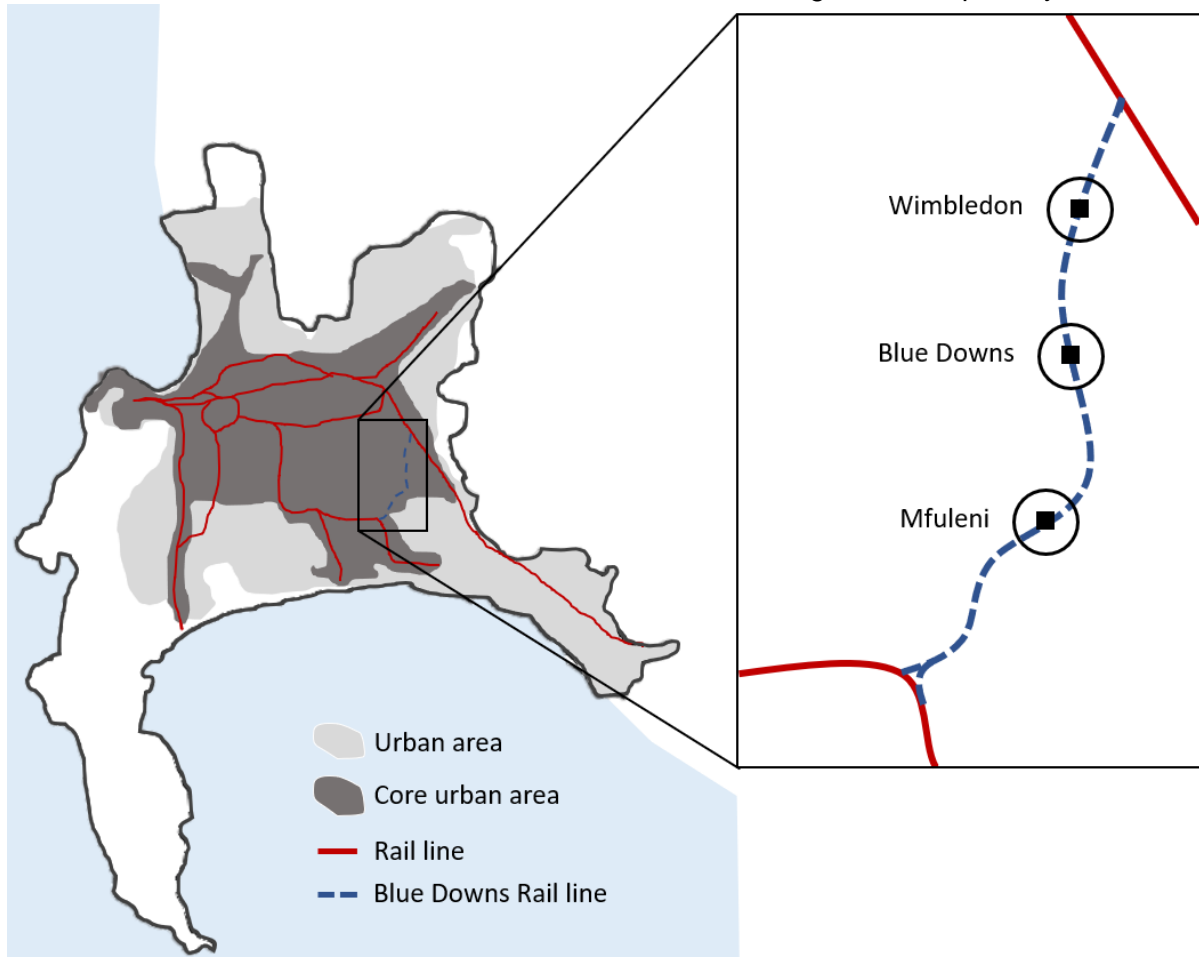


Figure 3: Map of Cape Town, South Africa and the Blue Downs rail project

located affordable housing and the 'Right to the city' in the public discourse (Feruglio, 2017; Diani et al., 2018). Public discourse initiatives, such as the Integration Syndicate, have brought together universities, civic organisations and members of the public to debate potential paths to overcome the spatial injustice rooted in the fabric of Cape Town (Moore, 2017).

Rail initiative

The City of Cape Town is looking to expand its rail network for the first time in decades through the Blue Downs Rail Link project (BDRL). The BDRL consists of a 10km rail line, with three new stations, connecting the neighbourhoods of Khayelitsha and Mitchells Plain to the city's second largest economic node, see Figure 3 (Transport and Urban Development Authority, 2018). These two neighbourhoods have among the lowest levels of income and accessibility in the city. The rail service would shift trips from existing bus and paratransit modes, and generate trips to the three new stations along the line. The project prompted the creation of an interdisciplinary, interdepartmental team to analyse the integration of land use and transport in the rail corridor, based on the principles of TOD. Furthermore, as rail is within the mandate of national government, the team consisted of members from two of the three spheres of government.

Gothenburg, Sweden

Landscape pressures

Since the 1970s, the population and built footprint of the Gothenburg region has been expanding steadily. The city has responded through suburbanisation and increasing polycentrism. This decentralising trend has increased travel times and distances, weakened historic economic nodes and created a higher dependency on the car for work and school commutes (Hagson & Mossfeldt, 2008). The growth of the region is putting pressure on existing infrastructure, housing stock, employment opportunities and transport services (Trafikanalys, 2017). The regional government, Västra Götalands Region, has, in its *Transportation Programme 2017-2020*, identified that there is insufficient capacity in the current transport system to meet the growing demand (Trafikanalys, 2017). Since the 1990s, Sweden has made a radical shift in housing policy, from a welfare driven housing policy to a more market-based one (Hedin, et al., 2012). This trend of economic liberalisation of accessibility-related sectors has led to increased social and economic polarisation in cities such as Gothenburg. Swedish cities are experiencing an intensification of gentrification, where the redevelopment of industrial areas, the infill of existing neighbourhoods and the establishment of new residential areas are all targeting middle- and upper-income residents (Thörn & Thörn, 2017). The ideals of the transport plans appear to be misaligned with the liberalisation of the housing market and the continued development of satellite commuter suburbs. Another threat to the accessibility system in the city is climate change, but not just as the existential threat that faces most cities. 61% of rail infrastructure, 62% of roads and 64% of tramways are at risk of flooding due to sea level rise (Ivari, 2015). It gives further impetus to the need for a transition to sustainable transport use.

Socio-technical regime

Techno-economic developments

The mobility regime in the Gothenburg region consists of a diverse range of options, including walking, cycling, private vehicles, buses, trains and trams, as seen in Figure 4. Approximately

46% of the transport infrastructure in Sweden is made up of highways, by length, and 86% of all trips are road-based (Trafikanalys, 2011). In Gothenburg, only 25% of work commutes are done using public transportation, compared to 43% in Stockholm (Ottemark, 2017). This may be due to the fact that rail travel times are on average 1.3 times longer than those by car (Trafikanalys, 2011). Like Stockholm, Gothenburg introduced a congestion charging scheme to reduce car use, but it has had far less success (Börjesson & Kristoffersson, 2015). The main alternative to the car, the railway system, is ageing and in great need of intensive maintenance and investment. Without a reallocation of budget toward the public transport system to create more viable access mode alternatives, the congestion charge largely remains a regressive tax on car users.

Actors and institutions

1. Industry/firms

There are three levels of governance in Sweden, the national government, responsible for setting national plans and targets, the regional government, responsible for setting policies providing public transport services, and the local government, which is responsible for planning, local investment and the maintenance of road infrastructure (Hellberg & Jonsson, 2014). All long-distance railways are planned and developed the national level through the Transport Administration (Rye & Wretstrand, 2019). Public transport in the Gothenburg region is provided by Västtrafik, a publicly owned company. Private operators then compete for some of the services in the public transport market through Västtrafik's procurement processes (Västra Götalands Region, 2016). Most housing and spatial planning is coordinated between the regional and local governments.

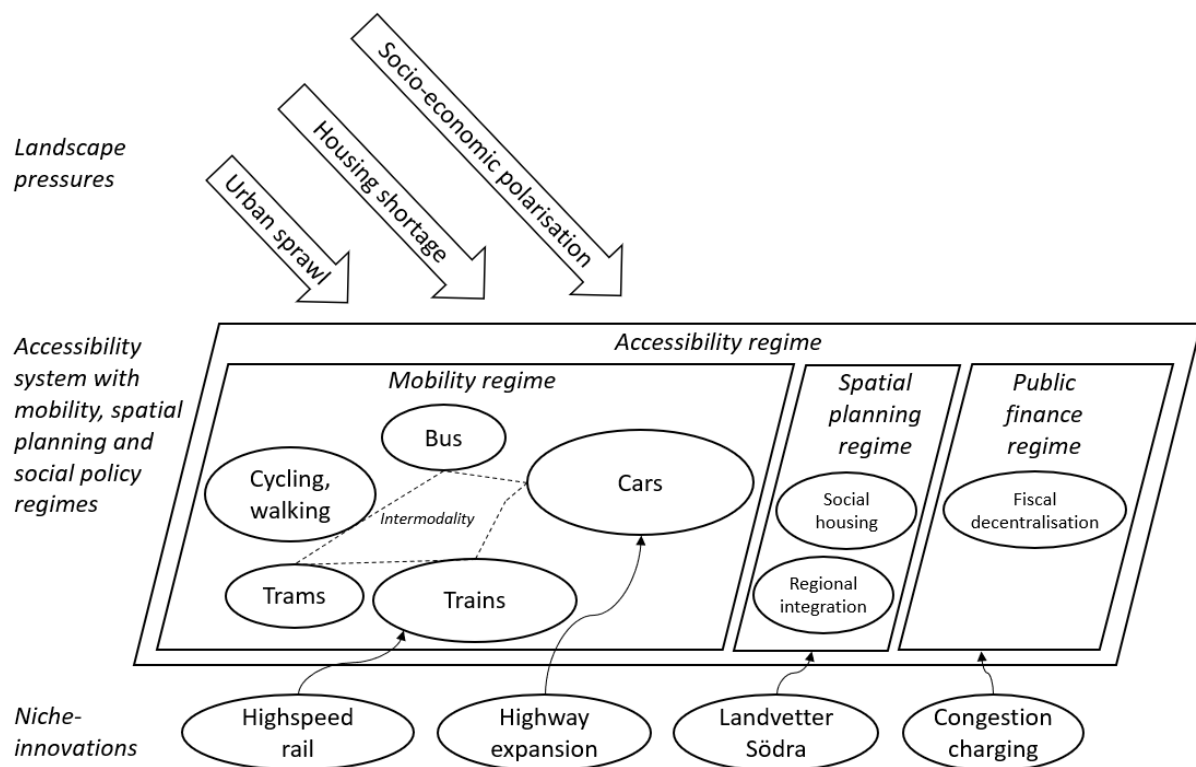


Figure 4: MLP-conceptualisation of accessibility system configuration in Gothenburg

Adapted from Geels (2018)

2. Consumers

Consumers in Gothenburg are willing to travel longer distances for work, school and leisure in order to live in suburban neighbourhoods that have cheaper housing opportunities. The cost of housing is a primary determinant in Swedish residents' relationship with access. Gentrification has pushed many public transport dependent consumers out of the well-located inner suburbs. Particular attention is paid to the socio-demographic characteristics of residents in Swedish cities as correlations between age, gender, parenthood and immigrant status with accessibility levels have been highlighted (Haugen & Vilhelmson, 2013).

3. Policymakers

The *Gothenburg 2035: Transport strategy for a close-knit city* reveals a mature and deep understanding of the principles of access and accessibility-based planning (Hellberg & Jonsson, 2014). The first objective of the strategy is to create an "easily accessible regional centre where it is easy to reach key places and functions irrespective of the mode of transport and other conditions" (Hellberg & Jonsson, 2014:5). The strategy mentions the need to increase access to neighbourhood services, such as local meeting places, by prioritising walking and cycling through community planning. The transport strategy has been developed in conjunction with a *Development Planning Strategy* and a *Green Strategy*, illustrating their perspective on the interrelatedness of these regimes. The Gothenburg transport department acknowledge that the evolution of the mobility regime also depends on the actions of non-state stakeholders (Hellberg & Jonsson, 2014). The strategy desires to create a city that is equally accessible to all. While still using mobility-based planning and design techniques, the policymakers of Gothenburg appear to fully support accessibility as the primary transport planning premise. It raises interesting questions, then, to see that, despite this strategy and these statements by the policymakers, satellite, suburban, car-dependent developments continue to be approved. The distinct disjuncture between policy and action adds a unique dynamic to the accessibility system.

4. Public discourse

The concepts of accessibility and transport justice have not gained as much popularity in the public discourse as they have in the policy realm. Rather, social justice movements have been on the increase as a response to gentrification and socio-economic polarisation (Thörn & Thörn, 2018). The discourse around housing affordability and the 'right to the city' bring principles of accessibility and equity into the public domain. Whether the wider public adopt similar arguments to the policymakers remains to be seen.

Rail initiative

The Swedish national government has set ambitious targets for the improvement of the railway system. One of the projects with the highest priority is the highspeed rail line from Gothenburg to Borås, see Figure 5. Increased capacity and reduced travel times could contribute to significantly higher accessibility levels in the Gothenburg region (Swedish Transport Administration, 2019). This unique opportunity has enabled a new collaboration with the municipality of Härryda, to develop a new commuter town, Landvetter Södra, along the rail line. The project is expected to many of the landscape challenges that the region is facing: urbanisation, urban sprawl, socio-economic polarisation and the housing shortage. However, an additional commuter town, reinforcing the suburbanisation trend, seems to be a counterintuitive solution to access inequity. The planning process has involved integrated co-

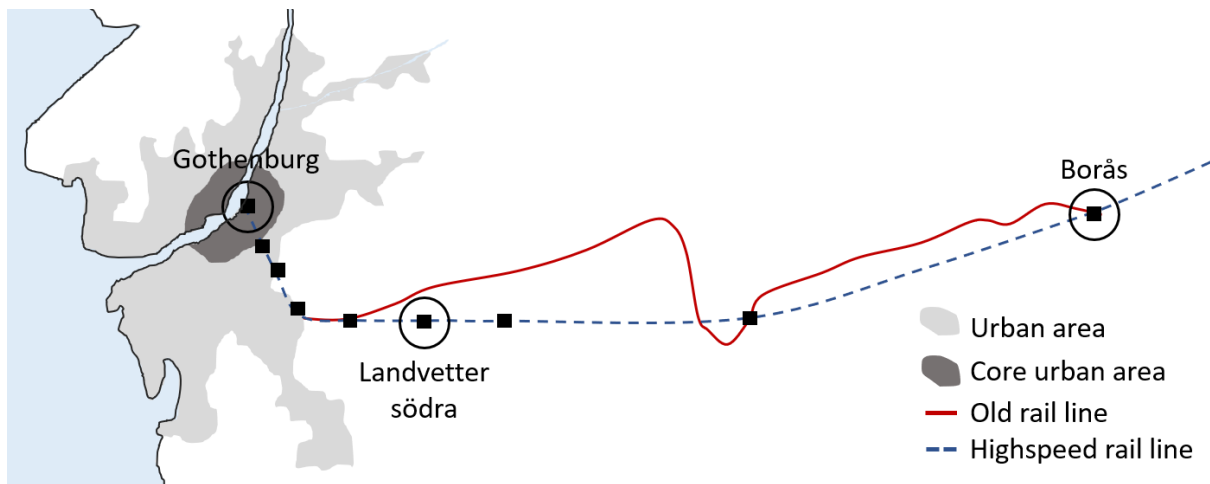


Figure 5: Map of Gothenburg, Sweden and the high-speed rail project

creation and backcasting methodologies which have enabled cross-sectoral collaboration between city officials, planners, politicians and researchers (Ranhagen & Groth, 2012).

Kisumu, Kenya

Landscape pressures

Kisumu is the third largest urban centre in Kenya with a population of approximately 500,000 people (County Government of Kisumu, 2018). The City has grown rapidly over the years right from its inception as a railway terminal over 100 years ago. The railway line—dubbed the Uganda Railway—has determined the growth of the cities in Kenya to a great extent. Kisumu has historically been a transport hub for Western Kenya, Eastern Uganda and Northern Tanzania with connections through road, rail and water transport (County Government of Kisumu, 2018). The Kenya Vision 2030 reiterates Kisumu as a key node in the national spatial framework of the Northern Transport Corridor (Republic of Kenya, 2007).

Kisumu was planned as a garden city with low densities in the upmarket areas, extensive intra-urban distances, large housing plots and lavish recreational space developed in the colonial town. This forms the urban core. Around the core, emerges a belt of informal housing, with limited access to the employment nodes. Further out is a vast rural hinterland, providing much of the commuting labour pool, with poor roads and even lower accessibility (Onyango 2018). The rise of the automobile has led to the development of business districts outside of the historic CBD, setting the basis for urban sprawl (Republic of Kenya, 2013).

The railway system, around which Kisumu was built, collapsed around the year 2000 and had a significant, negative impact on the local transport system (Republic of Kenya, 2007). This collapse, coupled with the rapid rise in motorisation since the collapse, has induced increasing congestion problems throughout the city (Onyango 2018). Despite the increase in the use of motorised vehicles, urban road infrastructure has seen minimal improvement (Republic of Kenya, 2007). The urbanisation and spatial expansion of the city have also contributed to the increasing pressure on the trunk roads and CBD. Vast tracts of well-located land adjacent to the CBD and along the lakefront, which could be used to stem the urban sprawl, are under the stewardship of the Kenya Railways Corporation and show little signs of being unlocked in the near future (Republic of Kenya, 2013).

Socio-technical regime

Techno-economic developments

The public institutions within Kisumu's mobility regime are fixated on road investments, and the control thereof; no level within the hierarchy of government has made significant investments into public transport in Kisumu (Cirolia, 2019). Consequently, accessibility largely relies on walking, cycling and an elaborate system of paratransit, including Matatus (small buses), Tuk Tuks (motorised Rickshaws) and Boda Bodas (motorcycle and bicycle taxis), visualised in Figure 6 (Republic of Kenya, 2007). Matatus operate on regular routes and can be grouped into two categories: intra-city 'town service' and regional 'distance' service (Cirolia, 2019). There have been proposals to establish a Bus Rapid Transit (BRT) system that would compete with the Matatu services, but it risks pushing the Matatus out of business on their trunk routes (Institute for Transportation and Development Policy, 2017).

The rail system is run by Kenya Railway Corporation; attempts to outsource its operation to a private company has stagnated (Republic of Kenya, 2013). Kisumu Central station, Kibos and Kisian stations have become moribund facilities. The Kibos and Kisian station buildings have been illegally utilised by private entrepreneurs as sites for commercial and social activities. Whereas the premises of the Kisumu station have been leased out by the Kenya Railways Corporation for direct commercial activities, including a popular restaurant.

Actors and institutions

1. Industry/firms

Kenya has three levels of governance, the national, county and local. The mobility regime is primarily governed and funded by various entities at the national government level, which

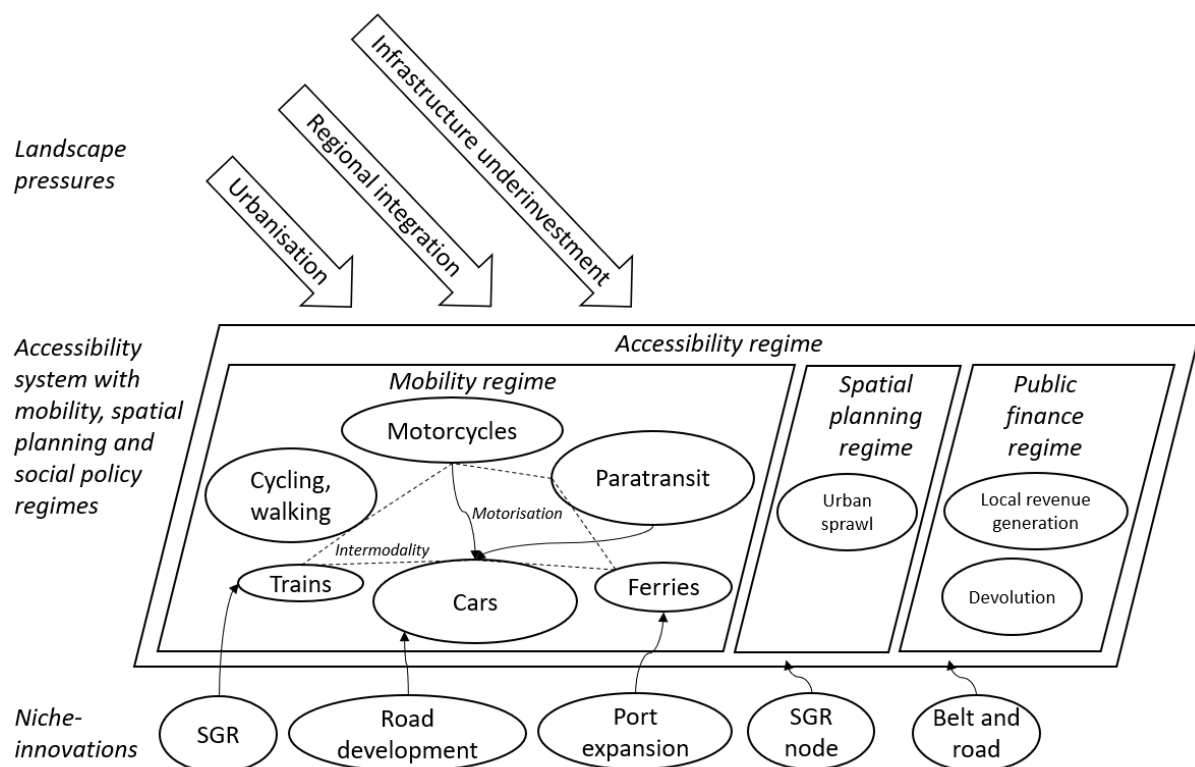


Figure 6: MLP-conceptualisation of accessibility system configuration in Kisumu

Adapted from Geels (2018)

individually oversee rail, highway and urban road development. Apart from road building, there is no state-run or state-funded entity that has the mandate to provide for the local accessibility needs of the residents of Kisumu (Cirolia, 2019). This gap in governance and funding has fueled the development of the myriad of private sector paratransit operators (Opondo & Kiprop, 2018). While the mobility and public finance regimes are strongly tied to the national government, spatial planning is conducted by the county and governments (Cirolia, 2019). This disjuncture has created intergovernmental tension as the objectives of local spatial plans are routinely disregarded by national government entities.

2. Consumers

The mobility system in Kisumu is a consumer-led solution space that was collectively created to meet their mobility needs. The paratransit industry is interwoven with the other sectors of the informal economy, within which most residents operate (Cirolia, 2019). The role of mobility producers within the structure and social capital flows of the communities means that consumers have a more complex relationship with the regime than those of a more formal system. Specifically, bicycle and motorcycle taxi operators have become key players in the transport system and their proliferation means that they now play an important role in the provision of accessibility, especially for low income consumers (Opondo & Kiprop, 2018). Millions of young Kenyans have ventured into the business as the ease of entry and low capital requirements make it an attractive enterprise (Opondo & Kiprop, 2018).

3. Policymakers

The County Government of Kisumu has developed a number of plans and strategies related to reconfiguring the accessibility regime. TOD and BRT are among the solutions offered to improve the efficiency, financial viability and affordability of access provision (Institute for Transportation and Development Policy, 2017). The City Council of Kisumu has developed an Integrated Strategic Urban Development Plan. It emphasises the need for sustainable urban growth while at the same time promoting and enabling economic growth, industrialisation, knowledge production, and a modernised transport system (Cirolia, 2019). However, the tendency for policy institutions to operate in silos has seen Kenyan Railway Corporation and the Kenyan Highway Authority, the primary providers of mobility infrastructure, operating with little input from local local or regional government (Republic of Kenya, 2013, Onyango 2018).

4. Public discourse

Employment and income are intricately tied to what access options are available to users in Kisumu. The public discourse centres primarily around the deteriorating transport infrastructure and access to affordable housing. Discussions around equity and transport justice have not been framed in these terms but there is a strong culture of collectivism that exists in these communities. The focus of government expenditure on the highway and road network has reinforced common car-related aspirations, which undermine public support for a more equitable allocation of infrastructure and road-space among the transport modes.

Rail initiative

The national government of Kenya has, together with Chinese investors, developed a comprehensive plan for development of a new railway system in Kenya. The Standard Gauge Railway (SGR) is to connect Mombasa to Kisumu, through Nairobi, and onwards to Malaba. The SGR will run parallel with the existing Kenya-Uganda railway line. The investment is part of the East African Railway Master Plan that aspires to link all the East African countries

through standard gauge railways (CPCS Transcom, 2009). The SGR has been funded through loans under China's 'Belt and Road Initiative', with aims of opening up the region to international trade and investments (Wissenbach & Wang, 2017). Kisumu's SGR station will be in the village of Kibos, seen in Figure 7, a few kilometres outside of the city's urban footprint. Improvements to the road network linking Kibos Station to the rest of the city is currently under development (Republic of Kenya, 2013). It is anticipated that improving the road network will provide sufficient accessibility options from Kibos Station to the rest of the city. However, the average level of access to the station will still be significantly lower than the level currently provided by the position of the original rail station.

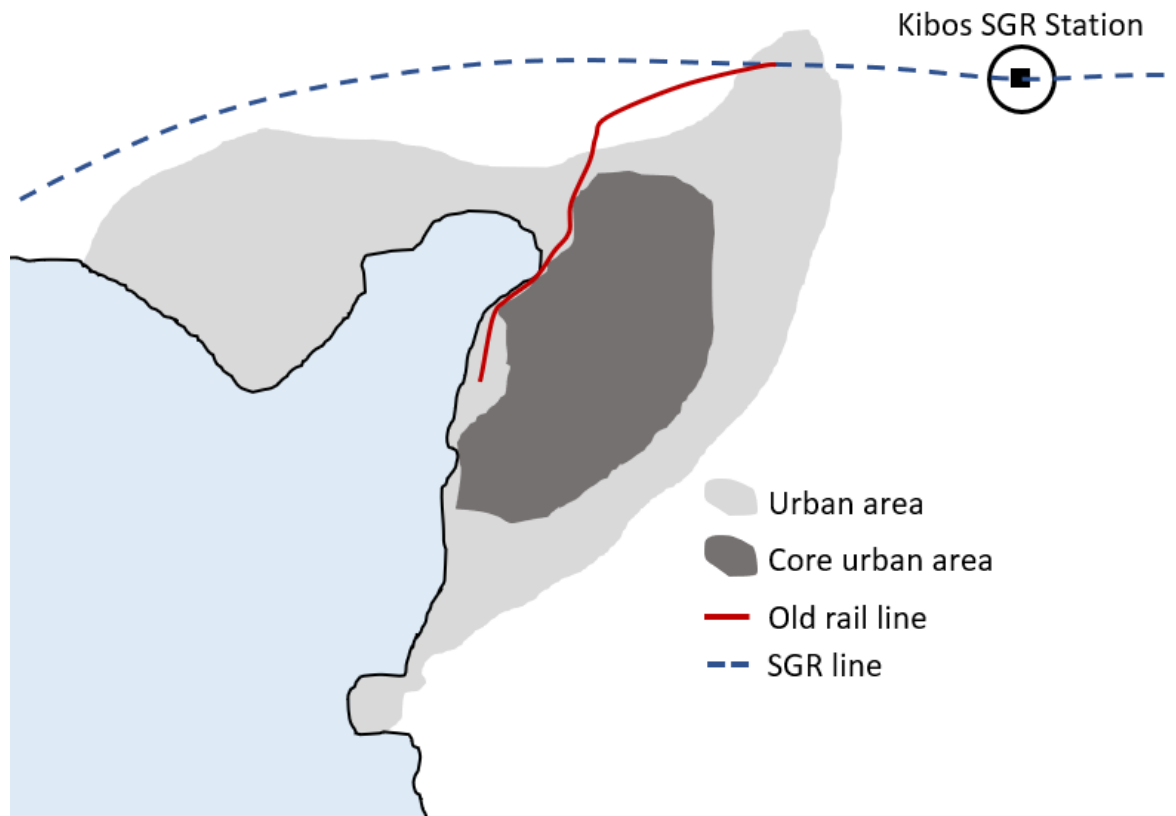


Figure 7: Map of Kisumu, Kenya and the standard gauge rail project

Interpretive analysis of potential transitions to accessibility-based planning

Landscape pressures

The landscape within which each of the accessibility systems operate is unique and very context-specific. Kisumu faces rapid urbanisation, Cape Town is trying to overcome the legacy of Apartheid spatial planning and Gothenburg is dealing with an entrenched suburbanisation trend. Despite the diverse contexts, some landscape challenges were applying pressure on the accessibility regimes of all three cities. The most prominent of these was the rising inequality and economic polarisation that was revealed within each of the regimes to be one of the most significant drivers of change. The consolidation of power and resources by the car-dependent upper income residents partially explains the disproportionate allocation of

budget toward road construction, in direct contrast to the tenets of transport justice and accessibility-based planning.

The trend of urban sprawl in each city has highlighted the disjuncture between the three regimes that make up the accessibility regime. The continued construction of residential and employment opportunities on cheaper, peripheral land meets many of the cities' spatial planning (housing) and finance objectives but undermines the overarching accessibility objective. The departmental and professional silos that characterise each of the three regime also create conflicting performance measures that need to be systematically revised. Accessibility-related decision-making processes by the respective city governments appear to still be entrenching access inequity rather than accelerating a transition toward solving them.

Techno-economic developments

In a historical analysis, the rise of private actors and the decline of state intervention, to the detriment of average accessibility levels, has been present in each city. Cape Town and Kisumu have seen marked system reconfiguration in favour of paratransit operators, to account for the decreasing reliability of their underinvested rail services. Each of the cities is at different stages of consideration for BRT as a part of their accessibility regime. The Kisumu county government perceives it to be a modernised alternative that will subsume the paratransit competitors. Cape Town city government found pure BRT to be financially unviable and are seeking to hybridise it with paratransit characteristics and paratransit operators. Whereas the Gothenburg regional government sees BRT as an incremental upgrade to existing advanced bus services. Three very different perspectives on a transport innovation that provides insight into their attitudes toward technology transitions.

Actors and institutions

Each city, and actor within the city, engages with the concepts of accessibility, transport justice and equity to a different extent. Often, the level of engagement correlated with the geographic scale that the institution had a mandate for. Each of the local spatial planning departments expressed a desire to move toward more accessible, equitable cities, whereas the nationally governed entities, responsible for rail or highway management, have explicit references to mobility-focused planning and movement-based performance indicators. This conflict in planning rationale could be resolved through the devolution of planning and financial management for transport infrastructure to the local government—an ongoing process in Cape Town and Kisumu—or a purposive realignment of change trajectories between the different scales of governance.

The engagement from consumers around access and equity, and its manifestation in the public discourse, is strongest in Cape Town. It has risen parallel to the longstanding discourse around its history of segregation and consistently high inequality. Therefore, the discussion is very spatially-focused. The urban form is seen as the largest contributor to inequitable access and has been foregrounded by both social justice advocates and policymakers. In Kisumu and Gothenburg, the income and affordability aspects of accessibility seem to be paramount. The relationship between income, transport mode use and level of accessibility is strong in the mind of consumers. Decoupling this association will require more than just reducing the subsidies and preferential treatment for car use. The socio-cultural dynamics within the accessibility regime need to be addressed in order to accelerate a transition toward transport justice.

Rail initiatives

The rail initiatives in each city have different aims, geographic scales and target user groups, but each reveals insight into the nature of the actors within each accessibility regime. In Kisumu, the initiative is being prescribed to the county government from the national sphere as the larger project has national and regional connectivity goals. The potential effect of the SGR on local transport has been an afterthought. In part, this appears to be in cognisance of the inherent flexibility and responsiveness of the paratransit industry that provides the bulk of the local access services. This may be an 'abrupt' transition, as defined by Elmqvist et al. (2019), but the informal sub-systems, including the paratransit services, are complexly interwoven and dynamically resilient which gives them a chance to adapt, as they did when the rail system first went into decline. Furthermore, the leasing of the old train station already demonstrates the potential for the reuse of any stranded infrastructure.

In contrast, Gothenburg's accessibility regime doesn't appear to have the same flexibility, especially considering the lock-in, structural inertia and undesired resilience of their car-dependent infrastructure. If the regional government attempts to force an abrupt transition to the new regional rail service, by restricting car use through measures like expanding the city's congestion charge system, there may be substantial stranded assets in both the car and bus regimes (Börjesson & Kristoffersson, 2015). Similarly, if changes to the urban form or housing market are not enacted in parallel, gentrification around the new stations would compound the negative distribution effects that have been observed due to the current congestion charge (West & Börjesson, 2018). Regional accessibility levels are predicted to increase significantly due to the high speed rail, but the distributional effect on local accessibility levels is less clear.

The accessibility regime in Cape Town is a complex mix of formal and informal, planned and reactive, deterioration and innovation. Unlike the other two initiatives, which add new modal regimes to the mobility landscape, the Blue Downs Rail Link is a major addition to an existing regime. Like Kisumu, the services that are likely to be displaced are those in the paratransit industry, and have the ability to adapt by serving demand elsewhere. And like Gothenburg, the local government will need to support the transition to prevent unsustainable competition. However, the change from flexible services to one with significant infrastructure lock-in, creates questions around the effect of resilience. Levels of accessibility are likely to rise, due to low income residents have direct access to a major employment node, but there is a risk that the new link will suffer from the same reliability issues as the rest of the network. Trading resilience and reliability for average accessibility doesn't speak to the principle of transport justice, even if it speaks to the common metrics. A hybrid system, similar to that being explored for the city's BRT, could bolster the resilience of the new link to operational and exogenous shocks.

Transition pathways to transport justice

Trying to locate any of these accessibility systems in the transition to transport justice seems to depend largely on which actor you're analysing and what metric you're measuring. The Gothenburg regional government is very explicit in its support for equitable access among its residents, but the infrastructural legacy of its car-dependent history creates an inertia that will be difficult to overcome. The ideals of the transport plans appear to be misaligned with the liberalisation of the housing market and the continued development of satellite commuter suburbs. The transition pathway to transport justice would need to include a much stronger collaboration among the spatial and transport planning regimes, with shared accessibility

performance metrics. The creation of a high-speed rail service does not appear to significantly support, nor hinder, this transition, but has the opportunity to be a catalyst for the introduction of these changes. The ideas of accessibility-based planning and transport justice have taken root within the system but they need to be upscaled to induce system reconfiguration.

The standard gauge rail project in Kisumu is aimed at boosting regional and transnational commerce and connectivity. Its effects on the local accessibility system have not been adequately considered. While drawing economic opportunities outside of the city limits may solve some of the congestion issues in the CBD, it could also increase the accessibility divide by favouring the car users and the recent highway upgrades. Currently, the demand-responsiveness of the paratransit system and its diverse range of mobility offerings appear to provide a surprisingly high level of accessibility, especially for an unsubsidised service. If the mobility system formalises, with the introduction of BRT and tougher regulation, accessibility may actually decrease. Furthermore, Kisumu's urban form is not dissimilar to that of a South African city—colonial centre, low densities and peripheral informal settlements—so it may run into the same financial challenges in the operation of more rigid, BRT-like services. Although, the SGR has started a more robust discourse between national government entities and local planning bodies, which could indirectly bear fruit in the future. Accessibility and transport justice are at the incubation stage of idea development in Kisumu, meaning it could be years before systemic reconfiguration occurs, but the culture of collectivism related to its paratransit industry should prime it for the transition.

Cape Town may be furthest, of the three cities, from transport justice, but it may also be the most likely to transition to accessibility-based planning. The striking level of inequality in the city is pushing innovative and progressive ideas to the fore, as the conventional planning techniques have failed to address the widening gap. The Blue Downs rail link is an incremental improvement to the accessibility system, but could have very positive distributional effects. However, this improvement is to a transport mode that is steadily deteriorating. The accessibility effects of improvements to networked infrastructure, like suburban rail, can be thwarted if the rest of the network is in decline. As the network is under the control of the national government, this may add even more uncertainty to the city government's accessibility planning system. Allowing paratransit services to run in parallel with the new rail link will reduce its financial viability, but may increase the resilience of the system as a whole. This would be in direct conflict with the traditional, efficiency-focused optimisation processes that govern most mobility networks. Accessibility-based planning as a concept is gaining traction with certain actors within the accessibility regime. Those that support this approach to transport, spatial and financial planning will need to scale it by creating collaborations across more of the departmental and professional silos within the city government.

Conclusions and further research

This paper aimed to apply the Multi-Level Perspective (MLP), and bring insight from the field of sustainability transitions, to a potentially fundamental change in transport planning. The study sought to build upon the extended-MLP framework that Geels (2018) used to examine a low-carbon transition of a mobility regime through system reconfiguration. As accessibility-based planning knits together the transport, spatial and financial planning processes, the idea of nested regimes was explored. Unlike the parallel regimes that affect the mobility system,

proposed by Geels (2018), the creation of a coherent, overarching accessibility system would require those regimes to undergo a similar reconfiguration to that of the mobility system.

The whole system reconfiguration approach provides a useful framework to combining institutional, planning and engineering perspectives. The ability to address multiple landscape dynamics, multiple niche-innovations and multiple interdependent regimes provides capacity to account for the complexity of access planning and access governance. There are many more applications in the transport and urban planning fields for which the whole system reconfiguration approach will be relevant and valuable. The approach proved to be a useful tool in explaining the transition to accessibility-based planning to transport planning practitioners in each of the three cities. It became a method of knowledge co-production, providing common reference points for discussion between the academics and practitioners in the study team. This became especially valuable for the academics and practitioners from the three different urban contexts to compare their transport planning experiences and perspectives. The addition of initiative-based learning, through a focus on rail projects, brought in the perspectives of stakeholders and the wider public. Bridging these analytical approaches provided vital insight into the performance of the accessibility systems from non-state actors.

The transition to accessibility-based planning is likely to be a gradual, incremental reconfiguration of a complex system. Insights from the three cities showed that the transition has begun, to various extents, and that the increments through which the systems are changing are not the same across different contexts. The transition is unlikely to be a linear, chronological evolution. Different actors are transitioning at different speeds, according to each context. In Gothenburg, the policymakers have an advanced understanding of transport justice and access equity, but the consumers continue to demand suburban housing and car-based mobility opportunities. In Kisumu, the paratransit regime is well-attuned to the differential accessibility needs of the communities that it serves, but it still relies on the infrastructure provided by government entities with very narrow perspectives on mobility. In Cape Town, the disparity in the transition seems to be between policy and implementation. Many of the actors within the regime are calling for a more equitable distribution of access in the city. However, the budget allocation still favours road infrastructure and BRT expansion over salvaging the rapidly deteriorating rail system and supporting the burgeoning paratransit industry.

The differential transition could create as much tension within the regime as the landscape challenges, opening up 'windows of opportunity' for the laggard actors to be disrupted. An example of this type of niche-innovation would be municipally-issued green bonds to finance accessibility- and sustainability-focused infrastructure projects that conventionally fall within the purview of national government financing. The City of Cape Town issued Africa's second ever municipal green bond in 2017, after Johannesburg in 2014, for ~\$70 million, from which funds were directed to bolstering underfunded accessibility projects, among others (Gorelick, 2018).

There are many research questions left outstanding by this preliminary study, and many limitations to the paper that would benefit from further research. Due to the early stage of this research and the proof-of-concept nature of this paper, a deeper analysis of each accessibility system will be conducted in subsequent publications. The effect that the trends of fiscal decentralisation and governance devolution are having on the planning systems of cities

needs to be examined in greater detail. Nationally coordinated and centrally funded mobility infrastructure programmes may be a key obstacle that will need to be navigated to achieve more equitable and sustainable access outcomes. The combination of integrated land use-transport modelling and transition frameworks could provide a robust scenario-testing toolbox for decision-makers within the transport and spatial planning professions. Finally, there are many avenues available to expand on the MLP approach taken in this study. A trend that hasn't been included under the accessibility regime in this study, but may have a substantial impact on accessibility levels in the future, is that of digitalisation. As more employment opportunities, services and activities are digitised, the demand for access through movement is likely to decrease, or the trip-purposes will change significantly. The resilience and adaptability of the accessibility system of a city is a topic that deserves increasing amount of research interest.

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