

Policy, users and discourses: examples from bikeshare programs in (Kolkata) India and (Manila) Philippines

Article (Published Version)

Sharmeen, Fariya, Ghosh, Bipashyee and Mateo-Babiano, Iderlina (2021) Policy, users and discourses: examples from bikeshare programs in (Kolkata) India and (Manila) Philippines. *Journal of Transport Geography*, 90. a102898 1-9. ISSN 0966-6923

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/94974/>

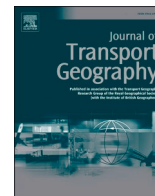
This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

Copyright and reuse:

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.



Policy, users and discourses: Examples from bikeshare programs in (Kolkata) India and (Manila) Philippines

Fariya Sharmeen^{a,*}, Bipashyee Ghosh^b, Iderlina Mateo-Babiano^c

^a Department of Geography, Planning and Environment, Institute for Management Research, Radboud University Nijmegen, the Netherlands

^b Science Policy Research Unit (SPRU), School of Business, Management and Economics, University of Sussex, Brighton, UK

^c Melbourne School of Design, The University of Melbourne, Australia

ARTICLE INFO

Keywords:
Bikeshare
Transition
User roles
Megacities
Global south
Kolkata
Manila

ABSTRACT

This paper examines two bikeshare programs implemented in two Global South cities, examining the role of users in promoting sustainable transport. To explore the sustainability of smart cycling, we argue that it is important to understand the prevailing administrative and socio-institutional practices within a given context. For the effective stabilisation of smart regimes, harmony between the administrative and socio-institutional practices must be established. In this context, we introduce a complementary approach to understanding transitions. Maintenance of political commitments and institutional support are crucial for cycling success, not incidental footloose initiatives. We explore two case studies in the context of the Global South, in the first one top-down policies and planning initiatives dictate the directions of transitions by enabling or constraining user routines. In the second one, citizens take control to resolve a transport deficit by initiating and driving a very bottom-up user-led transition narrative. We propose a framework to cater to the unique *political*, *cultural* and *smart discourses* of the Global South and the role of users in conjunction with the administrative and socio-institutional practices around them. Investigating both the bikeshare cases through the lens of this framework provides unique insights extending our knowledge beyond the built environment features of sustainable planning initiatives. Our findings reveal the complex narratives that are in play in developing nations and conclude that understanding and realising cycling transitions in southern megacities require a different approach compared to the Global North.

1. Introduction

Cycling is gaining its long-overdue attention across the globe in shaping sustainable urban regions of the future. Undoubtedly, urban policymakers around the world are acknowledging the many benefits of cycling – ranging from reduced air pollution in cities or improvement in individual health through ‘active travel’ (Bopp et al., 2016). Increasingly urban regions are offering innovative and shared modalities including cycling at the forefront to improve the living and travel choices in a more sustainable way. The Netherlands is often hailed as the ‘poster child’ in such efforts and rightfully so. According to reports published by the Dutch government, 27% of all trips made by Dutch residents in 2016 are on bicycles (Harms and Kansen, 2018). Cities across the globe are impressed and often obsessed with the Dutch model of bicycling. Trying to ‘import’ this model, many cities are investing in

cycle sharing schemes, cycle paths and other smart cycling infrastructure favourable for non-motorised transportation.

The first public bikesharing program dates back to the 1960s called ‘witte fietsen’ in Amsterdam. Since then there have been numerous bikesharing programs launched all over the world, including the global south. In India alone, fifteen cities have been planning to launch a public bikesharing system between 2017 and 2019 (Patel and Patel, 2019). Wide range public bikesharing programs are considered as a first important step to establish the transition to low-carbon active mobility (Mateo-Babiano, 2015). Unfortunately, though its uptake in Asia, with an exception to China perhaps, has been fairly limited (Mateo-Babiano et al., 2017).

There is something fundamentally problematic in trying to replicate the Dutch or the Western model in an attempt to promote sustainable practices, particularly in the Global South¹ context without taking the

* Corresponding author.

E-mail addresses: f.sharmeen@fm.ru.nl (F. Sharmeen), b.ghosh@sussex.ac.uk (B. Ghosh), imateo@unimelb.edu.au (I. Mateo-Babiano).

¹ Global South is not just a geographical category. It embodies certain characteristics like scarcity of resources, poverty, income inequalities, economic and environmental challenges (Rigg, 2007; Satterthwaite and Mitlin, 2012; Pagel et al., 2014).

<https://doi.org/10.1016/j.jtrangeo.2020.102898>

Received 30 January 2020; Received in revised form 1 September 2020; Accepted 20 October 2020

Available online 10 November 2020

0966-6923/© 2020 The Author(s).

Published by Elsevier Ltd.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

local socio-cultural heritage, traditions and citizens preferences into account (Tiwari, 2011; Patel and Patel, 2019; Pucher et al., 2005). Majority of the world's megacities (cities with more than 10 million population) are located in the Global South and they require a different approach towards sustainable mobility, given their population pressure and distinct socio-economic-environmental predicaments (Brandon and Ramankutty, 1994; Marcotullio, 2003; Pendakur, 1999; Pucher et al., 2007). Often the social stigma associated with cycling creates additional hurdles in addition to insufficient infrastructure and besmirched bureaucracies.

“Cycling in India is connected to socio-economic class; the ownership and use of bicycles is class specific..... Compared to, for example the Dutch context, where people are able to choose their mode of travel from among a range of options and use different modes for trips of different characteristics, the choice of mode in India is typically singular in nature; generally the available mode of transport that provides most comfort and is ‘highest’ on the social scale is used. A person owning a scooter or motorcycle will not use his bicycle, and a person in possession of a car will leave his scooter behind.... The fast developing young urban generation in India is going through a mobility ‘career’ in which the bicycle does not find a place anymore, and is seen as second class, connected to the unprivileged and with little scope for adequate mobility” (Brussel and Zuidgeest, 2012 and Bhamidipati, 2008 as cited in Brussel and Zuidgeest, 2012).

Summarizing from above-mentioned studies and the authors' own research, the challenges around cycling in Global South span from a. Technology and artifacts - The extent of access to multi-modal transport, internet and smartphones is low in Global South households; b. Culture - bicycles viewed as symbols of poverty; gender-specific as being 'not for girls'; and c. Infrastructure - lack of sufficient infrastructure for cycling. Road tax and regulations are arbitrarily defined and not enforced as written; substantial gap between what is on paper and what is practiced (Ghosh and Sharmeen, 2021). Moreover, the bicycling environment is experienced distinctly from its developed country neighbours, with far higher pollution levels, higher densities and very low levels of safety.

To achieve sustainability transitions in Asia, we must recognize the importance of both vertical and horizontal linkages² (Bai et al., 2009), yet also acknowledging the need to strengthen the horizontal and temporal dimensions of the technology. Recognizing these views, in this study, we examine two case studies, namely Kolkata in India and Metro Manila in the Philippines, to reveal the ability of sustainable mobility experiments (i.e. bikes sharing scheme) in paving sustainable development pathways by exploring their socio-technical systems, and revealing the key roles of actors at the grassroots and noting their importance in horizontal linkages. These narratives would be distinctly different between cultures, but both important to comprehend. This also acknowledges the importance of glocalisation as a phenomenon of what Norbert Elias refers to the development of a 'national habitus' which posits that while there are increasing similarities within nations, there are also increasing differences between people living in different countries (Elias, 1978). This is demonstrated in Kuipers' study in showing how the Dutch cycling culture ends at the national border (Kuipers, 2013).

We highlight the role of users in the uptake, success and failure in the transition processes towards sustainable mobility in the two empirical cases. The case studies show the persistent inequalities in the cities in the South. In addition to the unique challenges narrated above, the role of users in the context of such inequality, poverty and injustice is to be

² Vertical linkage refers to the vertical relationships that exist between levels, for instance, the link between local-level practices (micro) and national-level policies (meso), or it could also be between national-level policies (meso) and international governance regimes (macro); and horizontal linkages are links within levels, examples include between experiments in a level, such as within the micro-level or this could also refer to between regimes within the meso-level. In comparison to vertical linkages, studies that examine horizontal linkages have remained limited (Bai et al., 2009).

understood differently, compared to classic transition cases in the North (Ramos-Mejía et al., 2018; Swilling et al., 2016).

In Kolkata, the cycling regime has historically been one of the most important mobility systems, used by millions of low-income citizens for day-to-day travel and for supporting professions like door-to-door delivery of milk, newspapers etc. (Joshi and Joseph, 2015). This regime has witnessed several changes in the past decade, through the emergence of 'smart' cycling experimentation in the new parts of the city as well as increasing pressure to curb the existing cycling practices. In Metro Manila, cycling (with a side-cab) is considered as a form of public non-motorised transport, often serving as a first and last-mile alternative in local areas (Fillone and Mateo-Babiano, 2018; Gozun and Guillen, 2008). Yet it is still perceived as a poor man's alternative and cycling share remains low. However, there has been an increase in the awareness and consciousness within Metro Manila's residents of the social and environmental benefits of cycling. Who is driving these changes and how these changes are influencing user routines and cycling practices – are important questions that this paper seeks to address.

In order to explore the ongoing cycling regime transitions through the creation of bike sharing niches in both cities, it is important to understand the prevailing administrative policy and social institutions as well as the local unique cultural discourses that favour or obstruct different types of cycling practices. Cycling can be a utilitarian mode of transport, which the users prefer for day to day living and mobility purposes (Fernández-Heredia and Monzón, 2012). Alternatively, recent studies show that cycling practices are often deemed 'smart' and 'trendy' mode of transportation (Midgley, 2009). Whether utilitarian or smart, the practice of cycling is enabled through a socio-technical system (Geels, 2004). A socio-technical system around cycling involves not only the artefact (bicycle) and its associated infrastructure (lanes, signals etc) but also different actors like cycle owners, sellers, users, policymakers and activists. The interaction between the technologies and the actors are guided by rules which can vary in nature. Administrative policies, beliefs, user routines and socio-cultural norms – together form rule-sets that determine stability and change in the socio-technical system (Ghosh and Schot, 2019). A stable socio-technical configuration of actor, technology and rules can be considered as a socio-technical regime (Geels, 2004). Scholars working on sustainability transitions are interested in studying the shift of unsustainable regimes towards more sustainable socio-technical configurations. This paper advances this line of knowledge through an in-depth case study in the Global South context.

Change in socio-technical systems like cycling can be driven by many factors. Transitions can be initiated through administrative practices, i.e. top-down legal and planning initiatives, often driven by local political or global trendsetting agendas (Newell and Bulkeley, 2016). Other literature on grassroots innovations and bottom-up transitions highlight that transitions can happen through user-led innovations (Feola and Nunes, 2014; Wolfram, 2018). These studies claim that user innovations are shaped by socio-cultural beliefs and norms of the users (Hyysalo et al., 2013; Ornetzeder and Rohracher, 2006). At the same time, socio-cultural settings shape user acceptance of new technologies and policies, such as public bike sharing schemes (Bordagaray et al., 2014). In this paper, we analyse how users play different roles in order to boost, restrain or even reverse administrative and discursive practises towards sustainable mobility transitions (Schot et al., 2016). In order to demonstrate this, we needed a better understanding of differentiated socio-cultural meaning attached to cycling in a heavily class segregated society (Sheller, 2015; Hannam et al., 2006), alongside using the typology of users (Schot et al., 2016) as a method of analysis of different roles played by users in transition.

The main objective of this research is to explore how the ongoing cycling transition, exemplified through public bikesharing programs, is unfolding in the context of Asian megacities. Drawing from two bikesharing programs we analyse the interactions between new administrative rules and new user roles emerging along with the change processes. In India, top-down policies are known to drive transitions,

while users are seen as mere consumers. The opposite is to be seen for the Manila case study. Through our analysis, we show that user roles are in fact varied and goes beyond passive consumption of goods and services. Users play active roles in enabling or constraining regime change. Any understanding of sustainability transition is therefore incomplete without unpacking the role of users, even if the changes are primarily driven by policy actors.

The two bike sharing case studies of Global South provide unique insights because a comprehensive conceptual framework (illustrated in the following section) adhering to the prevailing discourses was used to critically examine them. To the best of our knowledge this is a first attempt of its kind to understand actor roles, discourses and niche innovations in two global south cities at the same time, bringing out interesting comparative insights. Moreover, by examining and categorizing the user roles we reflect on the role of horizontal linkages (as argued above) in the success and failure of bike sharing schemes. Very few studies have deeply investigated the socio-technical transition processes in cities in the Global South, especially focussing on cycling through a culturally sensitive lens and even fewer did a comparative case study analysis. Results from analysing the two case studies will help increase awareness on strategies that work/not work in increasing cycling consciousness in Asian megacities. Comparing the top-down and bottom-up approaches, the insights can potentially contribute to identifying factors influencing the success of active transport planning and policymaking, to inculcating a cycling culture among the youth, and to mainstreaming cycling as the new normal in going around cities and communities.

In the following section, we outline the conceptual framework. Next, we illustrate two case studies representing the above-mentioned trajectories and analyse the roles users played in the bikesharing programs. In conclusion, we reflect on the interactions between administrative and socio-institutional practices in cycling transitions.

2. Conceptual framework

The fundamental theoretical concept forwarded in this paper is that socio-technical transitions occur at the interactions between policy and social practices mediated by political and cultural discourses and user roles around sustainable interventions and technological innovations. We identify two types of practices – administrative and socio-institutional. Administrative practices refer to the regulations that shape the infrastructural ordinance for socio-technical transitions. It includes the legal frameworks, policy interventions and industry structure. Socio-institutional practices refer to the other side of the coin involving the routines, societal norms, belief systems and cultural traits. These two types of practices need to be coherent and complementary in order for a socio-technical transition to be successful. If one operates without due regard to the other, the possibilities of failure in transitioning towards sustainability increases. Actors such as active users facilitate interaction between these two types of practices. Different discourses around distinctive framings of sustainability, urban future visions also mediate the practices (Feola and Jaworska, 2019). Users interacting with these two domains leading to discourses around social and technological innovations, which further shapes the practices (Fig. 1). The semi-coherent alignment between these regulations and routines is a constantly negotiated and highly political process in the course of transitions towards sustainability.

Transition processes transform society in a fundamental way, setting directions for the next generations to follow. Governments and industrial actors play a role in it but the decision to bring about change rests on the society to a large extent (Rotmans et al., 2001). While long term continuity of political aspiration is imperative to maintain administrative practices, it should correspond to contemporary societal norms. In order to understand transitions and stabilisation of a new regime, it is imperative to understand the history and characterisation of these two types of practices in a given socio-economic context. Particularly to

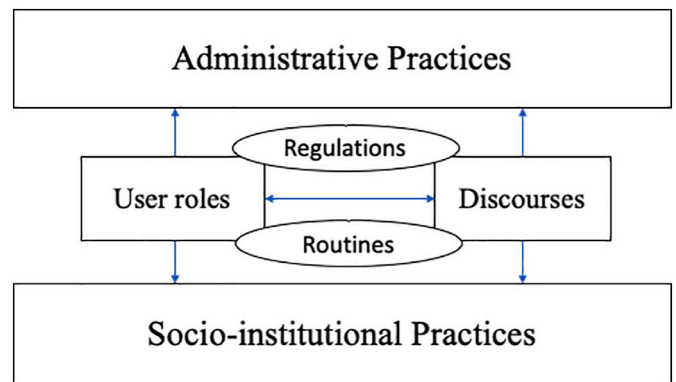


Fig. 1. Interaction domain of socio-technical transitions.

ensure retention of any new non-incremental change, the user has to assume a significant role with an aim of feeding back to the administrative practices. That is the only way to ensure retention and stabilisation of the regime (Nill and Kemp, 2009). Global cycling models, e.g. excellent infrastructures and integration to public transit, could be structurally brought in by administrative gateways in a foreign socio-cultural setting and can bring in success as well when they are dynamic and adaptive to local socio-institutional contexts.

Users and their behaviours are considered crucial in the literature on technological design, practice-oriented design approaches (Scott et al., 2009). In the context of changing socio-technical systems like mobility or energy, users are important stakeholders who enable and enact transitions. They are seen as more merely passive consumers, whose efforts in reorienting existing collective routines and practices to accommodate for new innovations are fundamental to successful transitions.

Schot et al. (2016) proposed five different user roles that facilitate transitions. These are user-producers, user-legitimators, user-intermediaries, user-citizens and user-consumers. Table 1 briefly summarises what each of the five different user roles encompasses:

These five categories are a stylised representation of the different roles and responsibilities that users carry out either in a group or individually. Mobilising these categories, it is useful to understand how users participate in transitions, in spite of and alongside policy and discursive interventions.

Following our discussion in the introduction, we identify three

Table 1
Typology of user roles in facilitating sustainable transitions (Schot et al., 2016: 4,5).

Types of user roles	Definition of each role
User-producers	ones who “invent, experiment and tinker with radical technologies, creating new technical and organizational solutions, articulating new user preferences and enabling new routines to emerge.”
User-legitimators	ones who “shape the values and worldview of niche actors, providing meaning, purpose and rationale for their activities. They help to anchor expectations and make them more socially robust”
User-intermediaries	ones who “create spaces for the appropriation, shaping and alignment of the various elements of emerging socio-technical systems, such as products, infrastructures and regulatory frameworks.”
User-citizens	ones who “engage in regime-shift politics, lobbying for a particular niche and against the regime (or other niches).”
User-consumers	ones who “not only buy products but also embed them in their daily practices, thereby defining their lifestyles.”

dominant discourses around sustainable initiatives in the Global South. One recognizing the need and corresponding political will, however partial, to decarbonise the transport sector (Ghosh and Sharmeen, 2021). We call it *political discourse*. Second, the socio-cultural aspects related to cycling uptake, mostly characterised by class segregation and social stigma, namely the *cultural discourse* (Brussel and Zuidgeest, 2012; Tiwari, 2002). Third, the dominance of technology and innovation in everyday living, referred to as the *smart discourse*.

Taken together, the framework combining all these elements allows us to explore the multilayered interaction between administrative practices and socio-institutional practices, through varied user roles and discourses shaping the process of ongoing transitions. This framework caters for the unique political, cultural and smart discourses of the Global South and the role of users in conjunction with the administrative and socio-institutional practices around them. Investigating both the bikesharing cases through the lens of this framework provides unique insights extending our knowledge beyond merely the built environment features of sustainable planning initiatives.

3. Research approach

The first case study for this paper is a bikesharing program in Kolkata, a megacity in India. The experimentation with cycle sharing in this city - the initial enthusiasm followed by a decline of the initiative is an interesting case to study from a transitions perspective because it showcases the change in multiple dimensions like policy, market and technology with very little attention to other important dimensions like user routines and their cultural embeddedness. The case of Kolkata's smart city cycling initiative therefore helps in a better understanding of the complex processes of socio-technical change in the Global South.

The second case study is a bikesharing pilot implemented in a large university in Quezon City, namely, University of the Philippines (UP), one of the highly urbanised cities in Metro Manila, the Philippines. The UP Bikeshare (UPBS), the case study in point, is a student-led, non-profit bikesharing program. The purpose of the entity is to provide the first fourth-generation bike sharing service in the Philippines. But the value of the pilot is the possibility to glean important insights into grassroots models of sustainable innovation, bikesharing schemes that develop from the bottom up.

Both case studies took an inductive approach to understand socio-technical change through primary and secondary data collection processes. The data for the first case study is collected during doctoral research fieldwork in Kolkata in 2015 and 2016 (Ghosh, 2019). This primary data collection phase included in-depth (an average of one and half hour long) semi-structured interviews with 12 policymakers, urban planners, representatives of user organisations and NGOs. Each of these interviews was tailored towards understanding the ongoing changes in the cycling regime - trying to gather insights on the multiple drivers, conflicting rationales, diverse expectations, opportunities and threats perceived of the changes (smart cycling and cycling ban) for the policymakers, users and activists. A focus group discussion was conducted with a group of women and their children between the age of 8 and 14 from low income and underprivileged section of society- who shared their experiences of using cycle as the utilitarian mode of transport in the older parts of the city and their perceptions of ongoing change in the system. These insights from interviews and focus group discussions were complemented by reports and documents accessed from government offices and NGOs. Other secondary materials are accessed from online sources - either from the organisations' websites or their social media platforms, in order to validate facts, information about the cycle sharing scheme and user activities.

Information derived from UPBS is drawn from a questionnaire survey implemented from May to July 2016. The questionnaire survey was implemented to establish the base condition in relation to bicycle use and examine the factors that influence uptake within the university's student body (Mateo-Babiano et al., 2020). While the data was not

specifically collected using transitions framework, the survey sought student responses both from users and non-users of the scheme, including students who were instrumental in the development of the UPBS scheme (Sunio et al., 2020). Moreover, primary data was supplemented with secondary data available from published scholarly materials. In doing so, the information collected enabled the researchers to derive insights across the typology of user roles in their contribution to sustainable transitions. Data was collected through a combination of an online survey that was posted in several local social media outlets, which targeted students enrolled at the university and supplemented by a paper-based questionnaire survey distributed in various university buildings by researchers. A total of 326 unique responses were completed.

While the two datasets were collected in a different manner, they contain the components necessary to analyse them using the conceptual framework narrated above. We use the three conceptual frames as units of analysis in this paper. First, we discuss the administrative practices that initiated a change in cycling regimes. Then we move on to locate socio-institutional practises of users and identify multiple roles they played navigating the two practice spaces. In the third part of the analysis, we reflect on the three discourses that connect these two types of practices and highlight the contrasting narratives of user experiences and willingness to adapt new routines, which explains why transitions in the Global South is a highly complex and messy process.

4. Case study Kolkata - PEDL

4.1. Administrative practices

A new cycling sharing initiative, named "PEDL" started its service in the green city Kolkata with around 200 cycles in December 2017. The system being dockless, 20 locations were chosen in the New Town, Kolkata where cycles can be accessed through scanning a QR code which will unlock the smart lock attached to the cycle. Each bicycle was fitted with real-time GPS tracking, safety alarms and could be charged using solar power (Maitra, 2017). Zoomcar, a private company leading in carsharing business in India took charge of providing the cycles and operating the system in their online platform (Ghosh, 2019).

The initiative to implement a cycle sharing scheme in Kolkata was conceived by visionary public officials who wanted to transform parts of Kolkata into a smart city (NKDA, 2015). In their research, they found this market to be competitive with many domestic as well as international operators looking for opportunities to expand their businesses in cities across India. Zoomcar for instance aimed to experiment with a new business model of mobility service provision in a new megacity in India. One of the policymakers insisted that the emerging market will take care of matching demand and supply for the new bike sharing scheme, hence indicating building a market niche of cycle sharing is at the heart of smart city vision. Even though Zoomcar was selected to implement the scheme, the officials indicated that they expect competition from Chinese bike sharing companies. However, in order to retain the market and scale up the experiment, Zoomcar kept the fare as low as 10 rupees for 30 min of renting (Maitra, 2017). In short, the key administrative practice around introducing cycle sharing in Kolkata was to promote a vision of a smart and sustainable mobility niche, expecting a competitive market for private companies to offer the service to smart citizens demanding 'cycling as a service' (Ghosh and Arora, 2019).

4.2. Socio-institutional practices - the role of users

During the short span of cycle sharing in the city, some users played the role of legitimator, intermediary and active consumer. The role of user legitimators was to convince the local citizens to embrace the cycle sharing niche as a new social practise in day to day travel. Citizen groups like 'Beacon Kolkata', Kolkata cycle samaj attempted legitimising the initiative, by promoting the benefits of cycling in social media outlets.

They have also organized events like rallies, training courses for young adults for cycling and awareness campaigns to create momentum around the practice of cycling in the city. Crucially, they tried to motivate young residents and professionals who work in New town Kolkata to avail of the dock-less commercial bikes for their last-mile commute. Part of this role was also to communicate the potential benefits of cycling to non-enthusiasts and non-cyclists, thereby attempting to change their preferences to newly emerging mobility practice.

The user groups also played the role of user-intermediaries aiming to align the visions of policy-makers and PEDL with existing mobility behaviour of the citizens. While they encouraged uptake of the new practise by urban middle-class citizens, they also communicated with policy-makers to provide the necessary infrastructure for safety and reliability of the service as a public transport mode. The role of the user-consumer is yet to unfold, however, changes in lifestyle, new ways of thinking about mobility are apparent in early signs of acceptance and enthusiasm with cycling sharing in the city. The vocabulary around active travelling and sustainability discourse is prominent, however not all users are fully convinced about the prospect of cycling sharing becoming the 'new normal'. Selected interviewees (urban middle class working in the corporate and public administration offices), remained sceptical about the level of comfort and safety of using dockless bikes, compared to using other mobility services like auto-rickshaws, e-rickshaws or even walking. Interviews with shopkeepers, construction workers and security guards (mostly men) in the gated complex further highlighted the conflict between cycling as a public service and regular cycling. They demanded safe and segregated bicycling lanes to use their own bicycles for commuting and didn't feel that the rented bikes from the PEDL scheme would be of any use to them (Ghosh and Arora, 2019). The women in similar occupations preferred walking or taking the bus. The focus group discussion also highlighted that mothers who would normally let their children cycle to school, but are increasingly finding it risky in heavily congested roads. They also didn't find cycling sharing as a novel practice.

The positive visions and enthusiasm about the perceived innovation (both from policymakers and some sections of users), therefore met with practical concerns and conflicting viewpoints from different income classes of users. Unlike the administrative practice, changing socio-institutional practices around cycle sharing remains to be a challenge in Kolkata, given the socio-cultural context which associates cycling with poverty and car ownership as a symbol of wealth (Joshi and Joseph, 2015).

4.3. Discourses

The bike sharing initiative in Kolkata promised new socio-technical arrangements, adhering to the *smart discourse*, like on-demand service, safety, app-based payments, self-service; arguably targeted to the higher income group of citizens living in New town Kolkata. Next to the *political discourse*, the PEDL initiative was driven by a well-articulated vision of sustainability, namely, saving the environment as well as staying healthy. Further discourses that supported the emergence of this niche were the prospects of cycle sharing as a mobility solution for last-mile connectivity between metro or bus stations to residences or offices. In an interview, one government official explained that.

“young professionals in Sector V [the new business district of Kolkata] are working 12-14 hours a day sitting in front of their laptop. They should cycle to and from the office in the final mile, even after they commute long distances by bus or metro. It is just a matter of habit. Once the infrastructure is in place, we would encourage young IT professionals to use the dockless bikes. It is very healthy for them in the long term.”

However, speaking to users, several concerns came to light regarding the applicability of this discourse in the settings of the demographics and

climate of Kolkata. One young woman, who recently started working in a reputed IT company in the adjacent business district to New Town Kolkata explained,

“Most of the year it is hot here. We already lose so much energy sweating while walking for only a few minutes. I would rather let and can afford to have someone drive me to the office [in an air-conditioned car] and save that energy from cycling for work”.

Another woman who works in a different office in the same business district further explained that their office doesn't have infrastructure like shower rooms and changing rooms to enable the switch between being a cyclist and a corporate businesswoman, on a day to day basis.

“Whoever is selling the idea of active travel, do they want to work 12hour shifts without being able to shower after cycling in 35-degree heat?” she asked the author.

These remarks suggest that the *political discourse* and the *cultural discourse* of targeted users on the new niche of smart cycle sharing often did not align. This observation makes us conclude that the future of cycle sharing in Kolkata doesn't look very promising in the short to medium term, in spite of a few user groups legitimising the idea of it and attempting to intermediate between policy and practise. Within months of implementing this initiative, Zoomcar discontinued the PEDL service with the reasoning to upgrade the design of the cycles.

5. Case study metro Manila – UPBS

The University of the Philippines is one of the largest universities in the country. It educates about 50,000 students across its 15 campuses nationwide. About 40% of these students attend classes in the Diliman campus, located in Quezon City, one of the 16 cities that comprise Metro Manila, attracting significant traffic to and from the campus on a daily basis. Getting to the campus for most of the students is mainly via public utility jeepneys (PUJs), (a type of informal public transport mode); using their own private vehicle; and for some, by bicycle. Some of the students who live inside the campus usually walk from one building to the other. The Diliman campus has a land area of 493 ha. It is a sprawling campus, accommodating several buildings within its relatively flat topography. It has a significant amount of green spaces which offer a quiet, leafier respite from the almost built-up urban concrete jungle of the metropolis. The mobility within the campus has been a persistent challenge for students when they need to transfer from one class to another with class venues located in different buildings, which are a few kilometres apart. It is often difficult to walk but easier to ride a bicycle. Also, two circumferential PUJ or jeepney routes ply around the campus, one circumnavigating in a counterclockwise while another on a clockwise direction.

There has always been a strong movement for universities to shape more sustainable futures (Verhoef et al., 2020). That movement is reflected in this case. As they give increasing priority to the challenges of sustainability, universities have played a key role in encouraging greener consumption behaviours (Naderi and Van Steenburg, 2018), shaping greener transport choices (Mohiuddin et al., 2018), and promoting active travel, including walking and cycling (Bopp et al., 2016). One sustainable innovation example to encourage active travel is campus-based public bike sharing programs (Kaplan and Knowles, 2015). Within the UP Diliman campus, one response is the introduction of a bike-sharing scheme, first conceived by a group of students in 2015, within the UP Diliman campus as a flexible personal mobility option for the university student body (Regidor, 2015). Moreover, universities also offer the ideal settings to implement sustainable transport innovations and cater to an ideal demographic to target bike sharing – young adult students with limited access to vehicle use and ownership (Gaegauf, 2014). What is unique about this case study lies in its genesis, evolution

and attempts towards sustainability.

5.1. Administrative practices

To a certain extent, university administrative policies were already present to support active transport. While not solely to provide infrastructure to support socio-technical transformations, these largely fragmented efforts were already in place to partly support walking for health within the university. For instance, the Academic Oval, which is a road circumnavigating the Campus core, has been converted into a shared zone. Half of the carriageway caters for walking and cycling while the outer half is allocated for private vehicles and public transport. As earlier mentioned, the UP Diliman campus is one of the few remaining urban green spaces within Metro Manila. So, when the university implemented car-free Sundays, many families visited the university not only to exercise, encouraging healthy practices such as walking and cycling but also staying longer to picnic and do other activities.

After UPBS' introduction, increasing support via administrative policies were subsequently put in place to support more active lifestyles within the university community. One of the most important initiatives was the revival of the university-level Non-motorised Mobility subcommittee which sits under the University Chancellor, two years after the beta roll-out phase of the UPBS. The subcommittee is composed of an interdisciplinary team of academics working closely with the Office of the Vice-Chancellor for Community Affairs (OVCCA) to encourage sustainable urban mobility within the campus through (Mateo-Babiano et al., 2018).

The revival Non-motorised Mobility subcommittee was organized at the university level. The group met to regularly debate, develop and implement supportive active travel policies. As a result, the subcommittee rolled out several new policies on road-sharing to progress non-motorised transport within the Diliman campus. This included the reallocation of the inner lane around the Academic oval as runners'/ joggers' path, separate from the cycle lane; imposing a 15kph speed limit; reinforcing the carless Sundays to support intergenerational active lifestyle; a stronger information awareness campaign of these regulatory interventions (Enano, 2018). The implementation of policies and social marketing strategies supported the alignment between the role of users, which in the case of UPBS is that of user-producers, user-citizens and user-consumers, and administrative practices and discourses, potentially explaining the relative success to date of UPBS (Sunio et al., 2020). The role of users will be taken up in the succeeding section.

5.2. Socio-institutional practices – the role of users

Building back a cycling culture in a car-based setting has persistently been a challenging task for most cities. Universities, therefore, foster an ideal cycling environment because of the availability of a large, safe space to ride. The introduction of a bike sharing program within the UP Diliman campus was one strategy that was thought to help encourage active travel and increase cycling share. UPBS created the system from the bottom-up, understanding and addressing students' needs as a priority. The role of users in this case where that of user-producers, user-citizens and user-consumers.

As user-producers, a free bike-sharing scheme was first conceived by a group of students in 2015. Sourcing financial support within the group and from willing benefactors to be able to purchase several bicycles, the bicycles were then used as part of a beta phase rollout of the UPBS in 2015 (Lee, 2016). It was only in 2016 that the groups of students became a recognised university organisation (Mojares and Laperal, 2016). As a student-initiated organisation, the UPBS first introduced around 30 units of the first generation of red-and-white painted bikes to the academic community. This increased to 72 bicycles a few weeks after, which was spread across 10 stations inside the Diliman campus. At its peak, UPBS was able to operate with a fleet of 100 bicycles, catering to

200 students in the university. They were able to source additional national government funding with the purpose of developing the first fourth-generation bike sharing service in the country.

As an initial step, the advocacy student group conducted a survey for students to determine the willingness to ride a bicycle assuming an active role as user-citizens. About 800 students responded. While 83% of the respondents indicated that they are willing to take up cycling within the campus, only 13% rode a bicycle. The main reason that there was a difference in intent and actual behaviour was due to the perception that it was not safe to ride and the inconvenience of having to bring their own bicycle around (Mateo-Babiano et al., 2020).

To respond, there were also several supplementary activities which attempted to link technological innovations with social practices. UPBS scheme implemented learning how to ride training events, riding events as part of their strategy to increase cycling uptake. For instance, the *18th Tour of the Fireflies, Bike for the Environment, 2018*, happened in the university as well – urging the then Chancellor to support the advocacy by conducting a symbolic painting of the university campus to mainstream bicycling. Hence, these were largely a reaction to the increasing consciousness of cycling (Mateo-Babiano et al., 2020).

Moreover, by working closely with students, it learned from its earlier iteration. For instance, the team decided to trial an SMS-based system responding to the low levels of smartphone ownership as well as the low proportion of access to mobile data within the UP community, students and staff. It also evaluated the pilot at the different stages of development, eliciting perceptions of both non-users and early adopters of the bike sharing, helping identify issues and challenges encountered and identify barriers to its operations.

In order for students to use the scheme, they had to first register with the organisation and then pay a minimal registration fee of approximately PHP50 (=USD 1) per month or PHP150 (=USD 3) per semester. The fee would then allow them to use any of the bikeshare bikes for one semester. There was no daily or per use fee to use the bicycle. The decision to do so was mainly to simplify the operation. At that time, the students running the scheme felt that a pay per use model would add to the logistical complexity of running a voluntary bikesharing scheme. A few months after, a second-generation scheme was subsequently launched. Based on the feedback from the users and bikesharing service, an improved version of the first-generation model was subsequently introduced. A key improvement of the second-generation scheme was the use of short message service or SMS that was sent to students for them to access these bicycles.

There was a clear iterative process using a 'learning-by-doing' approach to create change. The group continually experimented on and implemented small innovations to improve the bikesharing scheme. For instance, to complement students' limited access to smartphones and the lack of a reliable internet connection in some parts of the campus, it trialled the use of an SMS system for better communication, enabling a more robust and improved service quality. Through this experimental process, the student group was able to learn the potential and the limitations of the scheme and how it can better respond to its users, for instance. They were also able to tailor specific technologies that were more appropriate to the university setting, and limitations that would support the bikesharing scheme.

Each bicycle was secured with a chain lock system, which can be manually unlocked with the use of a 5-digit code. All bicycles use the same code to unlock. To avoid free-riders, the code was changed on a fortnightly basis. An SMS was sent out to all online registered users at the start of each week. This was also distributed via social media platforms. Still, there were reports of code leakage. This prompted the team to consider a more secure system wherein each bicycle now had a unique code that was changed every two weeks. Users would send an SMS message and would then receive the 5-digit code via an SMS response to be able to use their bicycle of choice. This marked the transition of UPBS into a second-generation public bikesharing program. With an in-house lock system, UPBS has now transitioned into a hybrid third-generation

bikesharing stage. It is in the process of transitioning and setting up a fourth-generation scheme.

There was a high familiarity with UPBS as a program and UPBS as an operator. About 93% of respondents reported that they were familiar with the UPBS program and 89% of the respondents know that the UPBS organisation operates the bikesharing program. However, while there was a high familiarity about the program and the organisation, only 1 out of 10 respondents was a member while 2 out of 10 have used the bikeshare bikes. The discrepancy may be explained by respondents who may have been members in earlier semesters but did not renew.

5.3. Discourses

In contrast to the PEDL case study, the UPBS initiative managed to navigate better through the *cultural*, *political* and *smart discourses*, primarily it being quite localized, small scale, comprising a relatively homogeneous young user group and in harmony with the existing *political discourse*. These contributed substantially to its success so far. However, upscaling of the scheme might be a challenge given the barriers mentioned below.

Barriers to uptake is an important point of consideration to better explain bikeshare uptake strategies. Based on the survey, students reported that not being able to bring large stuff/bags with them when using the bikeshare bike is a strong deterrent to use and uptake. They also reported that they did not like being hot and sweaty after riding the bicycle, and the lack of access to shower facilities also discourages them to use the bikeshare bike. As earlier explained, there are several means of accessing the campus, both by public and private means. Because of this, some respondents mentioned that it was more convenient to drive to/within the campus or take public transport instead of bike sharing.

When queried about the factors that influenced the users' decision to ride, they identified weather, particularly during 'heavy rain' and the 'amount of rainfall' as well as humidity deter them from riding the bicycle. They have also identified 'bicycle working condition,' 'bicycle safety,' and 'bicycle parking' as important considerations when deciding to ride a bicycle. Moreover, most reported that 'sharing the road with other vehicles', 'time of day' and 'sharing the road with pedestrians' were some of the other reasons they considered when deciding to ride/cycle.

Those who have used the bikeshare bikes were asked about their experience in using them/ they described their last bikeshare ride in a positive way. They reported that the UPBS was 'convenient,' 'it was easy to use,' 'using the service helps them save time,' 'it is comfortable to ride,' 'they feel safe,' the UPBS is 'reliable' and it is also 'available'.

For those who have tried riding the bikeshare bikes, users self-reported that they are strongly committed to riding bikeshare bikes:

"I expect to use the UPBS for more of my daily trips, if there is improvement in service quality", some also mentioned: "I am willing to recommend the UPBS service to others for their daily use", and "I will continue to use the UPBS service for more of my daily trips in the future."

Another important finding that came out from the survey was the barrier to learning how to ride - cultural restriction of riding a bicycle and negative perception of safety;

"I remember learning how to ride a bike when I was 10 against the wishes of my father. You see, culturally, riding/cycling was not something that girls and women participated in. In fact, some economies it would be illegal for girls to cycle. But we now know that people who cycle get a lot of benefits, not only better health, savings, and they are the happiest commuters."

Loorbach (2007) describes that the model of transition management is a combination of both "bottom-up" developments supplemented by "top-down" long-term goals. This manifests within the university

bikesharing model as a strategy that helped transition towards cycling culture. Several such 'bottom-up' developments advanced the desired active mobility regimes. These include the role of the student group spearheading the pilot bikesharing scheme on the campus. They have established themselves first as a group of friends that have an interest in finding ways to go around the campus in more sustainable ways. At the same time, the administrative landscape supported bottom-up development. The surrounding academic environment provided a conducive setting for active travel to thrive without the distractions of the noise and adverse impacts of pollution from speeding motorised vehicles. This meant that public spaces were for people rather than for vehicles.

6. Conclusion

Visions for smart cycling are homogeneous and concerted to the characteristic features of Global North initiatives, often neglecting the socio-economic, cultural and spatial contexts of urban mobility in the Global South. Planning for sustainable transition initiatives in the South should adhere to the unique socio-cultural aspects, the singular nature of modal choices, the stigma associated with social class systems, the gender bias, safety issues and high air pollution levels among others. To explore the sustainability of smart cycling, we argue that it is important to understand the prevailing administrative and socio-institutional practices. For effective stabilisation of smart regimes, a harmony between the prevailing administrative and socio-institutional must be established, reinforced by the role of users and prevailing *political*, *cultural* and *smart discourses*. We introduced a conceptual framework (Fig. 1) to extend our understanding of sustainable mobility transitions using the interconnections between these concepts.

We identify the role of users in response to two empirical cases of administrative initiatives to smart mobility transitions in two megacities of the Global South. Socio-technical transitions are driven by users, who are motivated by routines and future expectations, combinations of which can determine the type of roles users play in transition. The two case studies (PEDL in Kolkata and UPBS in Manila) presented shows how user practices boost, restrain or even reverse discursive and policy attempts to support or undermine sustainable cycling transitions. The study points to the complex narratives in a developing country contexts, where on the one hand top-down administrative practices trigger the transition process which is then legitimised, intermediated, lobbied and actively consumed with a certain set of users (PEDL) and bottom-up initiatives, on the other hand, where citizens take control, spearhead the path to sustainable transition by assuming the roles of producers, active citizens and users (UPBS). A summary of the findings is presented in Table 2.

The cycling regime change in Kolkata, as described in this case study of PEDL, can't be claimed as a 'user-led transition' story, in spite of several active involvements of user organisations and use of bicycling as a normal mode of mobility among a large section of the society. It is a policy-led attempt to develop a market niche that faces challenges in changing socio-institutional practices (user routines). This misalignment is visible in the conflicts between the political and the cultural discourses, which led to the failure of the initiative. Whereas the UPBS is in fact a user-led transition story, envisioned, initiated and implemented by users (students). Yet the niche experimentation faced similar challenges for upscaling and institutionalisation, as it is in Kolkata. These two cases, taken together, make it evident that the active role of users is only one determinant of niche creation but does not guarantee successful transitions to new regimes in the Global South, demonstrating the complex, social dynamics that are at the heart of these cities.

Several points of distinction from PEDL in Kolkata and UPBS in Manila emerged from the analysis providing useful insights to the success of bikesharing initiatives. First, the glaring misalignment among administrative and socio-institutional practices in the PEDL initiative evidently contributed to the failure. Whereas in the UPBS initiative we observe some harmony between them as well as efficient manoeuvring

Table 2
Summary of findings based on the conceptual framework.

	PEDL, Kolkata	UPBS, Manila
Administrative Practices	<ul style="list-style-type: none"> – Active mentoring of local government – promote a vision of a smart and sustainable mobility niche – creating a competitive market to offer ‘cycling as a service’ 	<ul style="list-style-type: none"> – University led initiative, laissez faire attitude of local and national government – Fragmented infrastructure to support active mobility – NMT subcommittee rolled out policies on road-sharing
Socio-Institutional Practices: Role of Users	User roles were of legitimators, intermediary, and consumers*	User roles were of producers, citizens, and consumers*
Discourses	Partial alignment between <i>political</i> and <i>cultural</i> discourses.	Better alignment through the <i>cultural</i> , <i>political</i> and smart discourses.

* See explanation on user roles in Table 1.

through the discourses, contributing to its success. Second, the role of users - while in both cases user-consumer role is common, only in the UPBS initiative we observe users assuming active roles of producers and citizens whereas in the PEDL case study their role is limited to being legitimators and intermediaries. This means users did neither take the lead nor were part of the decision-making process, contributing to the unpopularity of the initiative. Third, traffic safety is a major challenge in Asian megacities in particular discouraging everyday cyclists, an issue easier to address on university campuses, in contrast to a part of the city. While New Town Kolkata faces the safety issue upfront, this will be a challenge in upscaling the UPBS outside the university campus. Fourth, the training program was part of the UPBS initiative facilitating bicycling uptake and eventually would also help in upscaling beyond the campus. In contrast, the PEDL program did not have any learning process embedded in it, thereby stalling its uptake even further. Finally, the UPBS initiative thrived on a learning-by-doing strategy - with an iterative process starting from a pilot run to understand the barriers and update accordingly. The iterations and adaptive approach helped overcome the barriers and navigate through the political, cultural and smart discourses effectively to achieve success. Examples include the adoption of SMS to ensure security and the inclusion of bicycle training components to overcome gender bias. PEDL too, met with similar challenges, but were unable to adapt innovative strategies due to space for experimentation in a policy and market led niche.

Policy interventions, user interventions and institutional change are often simultaneous and overlapping- resulting in the process of the transition to be messy, multi-directional and packed with uncertainties. Our paper presents evidence of why and how cycling transitions in southern megacity contexts require different approaches compared to the Global North. Our findings suggest that changing socio-technical systems towards sustainability is not as straightforward process, that can happen through top down policies in the Global South given prevailing inequalities, heterogeneity of demands, extreme weather conditions, local skill sets misaligned with smart technologies, distinctive local social behaviour, and general distrust on elite policy initiatives among others. We propose a framework with components to analyse the unique features of socio-cultural norms, user roles and dominant discourses beyond built environment characteristics and political landscapes. It contributes to the understanding of the generalizability and transferability of smart and sustainable mobility transitions. However, more case studies and in-depth analyses are needed to advance the knowledge base on how transitions in the Global South can truly be sustainable and just for all. This research is but one of the early studies in this frontier. More scholarly observations on dynamics of mobility transitions in the South are welcome, not only in megacities, but also learning from smaller and potentially less auto-dominated cities in Asia.

Acknowledgement

We extend our utmost gratitude to the individuals, groups and associations who shared their time and materials in realisation of this

research in Kolkata and Metro Manila. In particular, the Philippines’ Department of Science and Technology – Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) which provided the financial assistance under the Balik Scientist Program to conduct the empirical study in the Philippines. We would also like to extend our grateful thanks to the able assistance of the UPBS team, its members and the Electrical and Electronics Engineering Institute for hosting and also providing support during one of the author’s stay at the University of the Philippines. We are also grateful to New Town Kolkata Development Authority for access to policy documentation and to Mrs. Mahua Biswas at the Institute of Psychological and Educational Research, Kolkata for co-operation and necessary arrangements for the focus group discussion. Our views reflect our own and do not reflect those of the organisations that we work for.

References

- 18th Tour of the Fireflies, Bike for the Environment. Retrieved from. <https://ptvnews.ph/18th-tour-fireflies-bike-environment/>.
- Bai, X., Wiecezorek, A.J., Kaneko, S., Lisson, S., Contreras, A., 2009. Enabling sustainability transitions in Asia: the importance of vertical and horizontal linkages. *Technol. Forecast. Soc. Chang.* 76 (2), 255–266.
- Bhamidipati, S.K., 2008. Can social or spatial variation explain students’ mode choice? MSc thesis ITC, Enschede.
- Bopp, M., Sims, D., Matthews, S.A., Rovniak, L.S., Poole, E., Colgan, J., 2016. There’s an app for that: development of a smartphone app to promote active travel to a college campus. *J. Transp. Health* 3 (3), 305–314.
- Bordagaray, M., Dell’Olio, L., Ibeas, A., Barreda, R., Alonso, B., 2014. Modeling the service quality of public bicycle schemes considering user heterogeneity. *Int. J. Sustain. Transp.* 9 (8), 580–591.
- Brandon, C., Ramankutty, R., 1994. Toward an environmental strategy for Asia. In: *World Bank Discussion Papers*.
- Brussel, M., Zuidgeest, M., 2012. Chapter 8 cycling in developing countries: context, challenges and policy relevant research. *Transp. Sustain.* 181–216.
- Elias, Norbert, 1978. *The Civilizing Process*. Blackwell.
- Enano, J., 2018. UP Issues New Policies on Road-Sharing Scheme to Prevent Bike Accidents. Retrieved from. <https://newsinfo.inquirer.net/962345/up-issues-new-policies-on-road-sharing-scheme-to-prevent-bike-accidents#ixzz6LVv3Icjq>.
- Feola, G., Jaworska, S., 2019. One transition, many transitions? A corpus-based study of societal sustainability transition discourses in four civil society’s proposals. *Sustain. Sci.* 14 (6), 1643–1656.
- Feola, G., Nunes, R., 2014. Success and failure of grassroots innovations for addressing climate change: the case of the transition movement. *Glob. Environ. Chang.* 24, 232–250.
- Fernández-Heredia, Á., Monzón, A., 2012. Analysis of perceptions of utilitarian cycling by level of user experience. TRB 2012 paper # 12-1379. Accessed from Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: insights about dynamics and change from sociology and institutional theory. *Res. Policy* 33 (6–7), 897–920.
- Fillone, A.M., Mateo-Babiano, I., 2018. Do I walk or ride the rickshaw? Examining the factors affecting first-and last-mile trip options in the historic district of Manila (Philippines). *J. Transp. Land Use* 11 (1), 237–254.
- Gaegauf, T., 2014. Bikeshare Technology White Paper: A Comparative Guide to the Different Technologies Offered by Bikesharing Vendors. http://mobility-workspace.eu/wp-content/uploads/Bikeshare_Technology_White_Paper.pdf.
- Geels, F.W., 2004. From sectoral systems of innovation to socio-technical systems: insights about dynamics and change from sociology and institutional theory. *Res. Policy* 33 (6–7), 897–920.
- Ghosh, B., 2019. Transformation Beyond Experimentation: Sustainability Transitions in Megacities. Doctoral dissertation. University of Sussex.

- Ghosh, B., Arora, S., 2019. Smart as Democratically Transformative? An Analysis of 'Smart City' Sociotechnical Imaginary in India STEPS Working Paper 109. IDS, Brighton.
- Ghosh, B., Schot, J., 2019. Towards a novel regime change framework: Studying mobility transitions in public transport regimes in an Indian megacity. *Energy Res. Soc. Sci.* 51, 82–95. <https://doi.org/10.1016/j.erss.2018.12.001>.
- Ghosh, B., Sharmeen, F., 2021. Understanding cycling regime transition and inequality in global south: case study of an Indian megacity. In: Zuev, D., Psarikidou, K., Popan, C. (Eds.), *Cycling Societies: Innovations, Inequalities and Governance*, 1st, Routledge Studies in Transport, Environment and Development. Routledge.
- Gozun, B.C., Guillen, M.D.V., 2008. Towards a sustainable transportation environment: the case of "pedicabs" and cycling in the Philippines. In: CODATU XIII. Challenges and Solutions for a Sustainable Development. CODATU, Ho Chi Minh City, Vietnam. <http://www.codatu.org/wp-content/uploads/Towards-a-sustainable-transportation-environment.-The-case-of-Pedicabs-and-cycling-in-the-Philippines-Brian-GOZUN-Marie-Danielle-GUILLEN.pdf>.
- Hannam, K., Sheller, M., Urry, J., 2006. Mobilities, immobilities and moorings. *Mobilities* 1 (1), 1–22. <https://doi.org/10.1080/17450100500489189>.
- Harms, L., Kansens, M., 2018. Cycling facts. Netherlands Institute for Transport Policy Analysis. KIM (Accessed on 5th November 2018).
- Hyysalo, S., Juntunen, J.K., Freeman, S., 2013. User innovation in sustainable home energy technologies. *Energy Policy* 55, 490–500.
- Joshi, R., Joseph, Y., 2015. Invisible cyclists and disappearing cycles: the challenges of cycling policies in Indian cities. *Transfers* 5 (3). <https://doi.org/10.3167/trans.2015.050303>.
- Kaplan, D.H., Knowles, M.J., 2015. Developing a next-generation campus bike-share program: examining demand and supply factors. *Plan. High. Educ.* 44 (1), 63.
- Kuipers, G., 2013. The rise and decline of national habitus: Dutch cycling culture and the shaping of national similarity. *Eur. J. Soc. Theory* 16 (1), 17–35.
- Lee, R., 2016. UP Students Introduce a Healthier and Greener Way to Travel. Retrieved from. <https://www.wheninmanila.com/up-bike-share/>.
- Loorbach, D., 2007. *Transition Management. New Mode of Governance for Sustainable Development*. International Books, Utrecht.
- Maitra, S., 2017. Soon, rent a cycle at new town. In: *The Times of India*. Available at: <http://timesofindia.indiatimes.com/articleshow/61775923.cms> (Accessed 20 August 2018).
- Marcotullio, P.J., 2003. Globalisation, urban form and environmental conditions in Asia-Pacific cities. *Urban Stud.* 40 (2), 219–247.
- Mateo-Babiano, I., 2015. Public bicycle sharing in Asian cities. *J. East. Asia Soc. Transp. Stud.* 11, 60–74.
- Mateo-Babiano, I., Kumar, S., Mejia, A., 2017. Bicycle sharing in Asia: a stakeholder perception and possible futures. *Transp. Res. Procedia* 25, 4966–4978.
- Mateo-Babiano, I., Tiglaio, N.M.C., Mayuga, K.A., Mercado, M.A., Abis, R.C., 2020. How can universities in emerging economies support a more thriving cycling culture? *Transp. Res. Part D: Transp. Environ.* 86, 102444.
- Mateo-Babiano, I.B., Rivera, R., Gaabucayan-Napalang, S., Mayuga, K., Tiglaio, N., 2018. Transforming Universities into Sustainable Campuses, One Pedal at a Time. Retrieved from. <https://www.rappler.com/views/imho/193051-transforming-universities-sustainable-campus-pedal>.
- Midgley, P., 2009. The role of smart bike-sharing systems in urban mobility. *Journeys* 2 (1), 23–31.
- Mohiuddin, M., Al Mamun, A., Syed, F., Mehedi Masud, M., Su, Z., 2018. Environmental knowledge, awareness, and business school students' intentions to purchase green vehicles in emerging countries. *Sustainability* 10 (5), 1534.
- Mojares, E., Laperal, M., 2016. These UP Students Started Southeast Asia's First Smart Bike Sharing System. Retrieved from. <https://www.kalibrr.com/advice/2016/10/up-bike-share-is-taking-the-streets-by-storm>.
- Naderi, I., Van Steenburg, E., 2018. Me First, Then the Environment: Young Millennials as Green Consumers.
- Newell, P., Bulkeley, H., 2016. Landscape for change? International climate policy and energy transitions: evidence from sub-Saharan Africa. *Clim. Pol.* 17 (5), 650–663.
- Nill, J., Kemp, R., 2009. Evolutionary approaches for sustainable innovation policies: from niche to paradigm? *Res. Policy* 38 (4), 668–680.
- NKDA, 2015. Smart city proposal. In: Smart city challenge Stage 2. Smart City Mission, India.
- Ornetzeder, M., Rohracher, H., 2006. User-led innovations and participation processes: lessons from sustainable energy technologies. *Energy Policy* 34 (2), 138–150.
- Pagel, H., Ranke, K., Hempel, F., Köhler, J., 2014. The use of the concept "global south" in Social Science & Humanities. *Univ. Calif. Berkeley* 125, 13–19.
- Patel, S.J., Patel, C.R., 2019. An infrastructure review of public bicycle sharing system (PBSS): global and Indian scenario. In: *Innovative Research in Transportation Infrastructure*. Springer, Singapore, pp. 111–120.
- Pendakur, V.S., 1999. A policy perspective for sustainable cities-non-motorized transport (NMT) in Asia. *IATSS Res.* 23, 51–61.
- Pucher, J., Korattyswaropam, N., Mittal, N., Ittyerah, N., 2005. Urban transport crisis in India. *Transp. Policy* 12 (3), 185–198.
- Pucher, J., Peng, Z., Mittal, N., Zhu, Y., Korattyswaropam, N., 2007. Urban transport trends and policies in China and India: impacts of rapid economic growth. *Transp. Rev.* 27 (4), 379–410.
- Ramos-Mejía, M., Franco-García, M.L., Jauregui-Becker, J.M., 2018. Sustainability transitions in the developing world: challenges of socio-technical transformations unfolding in contexts of poverty. *Environ. Sci. Pol.* 84, 217–223.
- Regidor, A., 2015. *Bike Sharing Service at UP Diliman*. Retrieved from. <https://upd.edu.ph/~upinfo/aug15/articles/Bike%20sharing%20service%20at%20UPD.html>.
- Rigg, J., 2007. *An Everyday Geography of the Global South*. Routledge.
- Rotmans, J., Kemp, R., Van Asselt, M., 2001. More evolution than revolution: transition management in public policy. *Foresight* 3 (1), 15–31.
- Satterthwaite, D., Mitlin, D., 2012. *Urban poverty in the global south: scale and nature*. Routledge.
- Schot, J., Kanger, L., Verbong, G., 2016. The roles of users in shaping transitions to new energy systems. *Nat. Energy* 1 (5), 16054.
- Scott, K., Quist, J., Bakker, C., 2009. Co-design, social practices and sustainable innovation: Involving users in a living lab exploratory study on bathing. In: *Proceedings of Paper for the "Joint Actions on Climate Change" Conference*. Aalborg, Denmark, pp. 8–9.
- Sheller, M., 2015. Racialized Mobility Transitions in Philadelphia: Connecting Urban Sustainability and Transport Justice. *City & Society* 27 (1), 70–91. <https://doi.org/10.1111/ciso.12049>.
- Sunio, V., Laperal, M., Mateo-Babiano, I., 2020. Social enterprise as catalyst of transformation in the micro-mobility sector. *Transp. Res. A Policy Pract.* 138, 145–157.
- Swilling, M., Musango, J., Wakeford, J., 2016. Developmental states and sustainability transitions: prospects of a just transition in South Africa. *J. Environ. Policy Plan.* 18 (5), 650–672.
- Tiwari, G., 2002. Urban transport priorities: meeting the challenge of socio-economic diversity in cities, a case study of Delhi, India. *Cities* 19 (2), 95–103.
- Tiwari, G., 2011. Key mobility challenges in Indian cities. In: *International Transport Forum Discussion Paper Series*. OECD, p. 34.
- Verhoef, L.A., Bossert, M., Newman, J., Ferraz, F., Robinson, Z.P., Agarwala, Y., Wolff, P. J., Jiranek, P., Hellinga, C., 2020. Towards a learning system for university campuses as living labs for sustainability. In: *Universities as Living Labs for Sustainable Development*. Springer, Cham, pp. 135–149.
- Wolfram, M., 2018. Cities shaping grassroots Niches for sustainability transitions: conceptual reflections and an exploratory case study. *J. Clean. Prod.* 173, 11–23.