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How participatory planning processes for transit-oriented development contribute to social sustainability

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Abstract Transit-oriented development (TOD) is a relatively recent neighbourhood development concept associated with the three dimensions of urban sustainability (environmental, economic and social). Traditionally, TOD has been associated with environmental and economic benefits. Recent research has shown evidence of positive social outcomes related to the spatial characteristics of TOD areas. But the social sustainability that can be drawn from TOD interventions may multiply when designed through participatory planning processes. Here, I combine TOD literature with that of collaborative urban planning to highlight the potential of participatory TOD for urban social sustainability.

Keywords Transit-oriented development · Bus rapid transit · Public transport accessibility levels · Urban sustainability · Public transport services · Public participation

TOD and urban sustainability

Sustainable urban development goes hand in hand with the concept of transit-oriented development (TOD) (Newman and Kenworthy 1999; Belzer and Autler 2002; Renne 2008; Curtis et al. 2009; Nahlik and Chester 2014). TOD is a relatively recent neighbourhood development concept associated with the three dimensions of urban sustainability (environmental, economic and social). It aims at decreasing transport distances through diverse land use patterns, moderate to high residential and employment density, frequent and well connected public transport services (PT) and street network design that prioritizes pedestrian and transit users. This results in expanded use of non-motorized transport modes and a shift away from car ridership.

There is strong evidence of global and local benefits on environmental and economic issues arising from TOD projects. Land use diversity and transit ridership shift transport modes from fossil fuelled to low-carbon intensity ones and reduces transport distances. Consequently, emissions from green house gases and local air pollutants decrease together with traffic congestion. Such changes generate economic gains with regards to transport efficiencies and ecosystems quality (Newman and Kenworthy 1999; Belzer and Autler 2002; Vickerman 2008; Rahul and Verma 2013; Nahlik and Chester 2014). Next, households save on transport costs (Dubé et al. 2011; Nahlik and Chester 2014) and see an appreciation in home prices related to the increase in location attractiveness (Rahul and Verma 2013; Hasibuan et al. 2014; Nahlik and Chester 2014).[1] At the regional level, TOD projects often stimulates private investment, job creation, and overall competitiveness (Knowles 2012), which enhances socio-economic circumstances. Although there is less research evidence, TOD may also contribute to social sustainability (Kamruzzaman et al. 2014). Research to date has only looked at the link between the spatial characteristics of TOD neighbourhoods and social capital. In this article, I focus on the unexplored synergies that could take place when linking TOD projects with participatory planning processes. I first summarize the evidence related to TOD and social capital and identify important knowledge gaps. Next, I summarize the current evidence on the effects of transport and urban

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[1] Increase in location values may, however, decrease housing affordability if no parallel land policies occur.

planning interventions on social sustainability. I then describe the concepts of participatory planning and the methodologies available that could be applied to TOD. I use these strands to argue that participatory planning would improve the social benefits of TOD.

TOD and social sustainability

Empirical evidence covers the relationship between specific built environment characteristics of TOD areas (i.e. density, planned mixed land uses, walkability and street design) and social capital (one aspect of social sustainability). Social capital comprises all institutions, relationships and customs that shape the quality and quantity of social interactions in a community (The World Bank 2011). Findings suggest that the built environment influences social capital, but the empirical relationship remains unclear. For example, although TOD fosters dense development, denser neighbourhoods do not always provide higher social capital (Glaeser and Gottlieb 2006; Dempsey et al. 2012). Mixed land uses, another intrinsic characteristic of TOD, have also shown divergent outcomes. In line with this argument, (Lund 2003) found a weak relationship between neighbourhood environment features and social interactions in Portland, Oregon (US). Counterarguments also exist: (Leyden 2003) Irish study showed that mixed-use neighbourhoods had higher levels of social capital. Similarly, there is no clear evidence on the link between public transport accessibility levels (PTAL) and social capital, although most scholars agree that it positively affects social inclusion (Stanley and Lucas 2008; Currie and Stanley 2008; Stanley and Vella-Brodrick 2009; Stanley et al. 2010, 2012). What is clear is that walkable neighbourhoods perform better in terms of social sustainability. Pedestrian-oriented neighbourhoods foster a sense of community (Lund 2002; Leyden 2003; Du Toit et al. 2007), trust, political participation, and social engagement (Leyden 2003; Mason 2010; Wood et al. 2012). There is only one study comparing TOD and non-TOD areas for the case of Brisbane (Australia). Results showed that individuals living in TOD areas had a significantly higher level of trust and reciprocity and connexion with neighbourhood compared to non-TOD areas, which indicates that specific built environment characteristics of TOD areas may foster the development of social capital (Kamruzzaman et al. 2014). Interestingly, however, the same study found negative relations between the indicators of social capital they used and the built environment characteristic when such relations were assessed individually. Still, the relationship between different built environments and other aspects of social capital (i.e. participation in networks, civic engagement, the existence of pooled community resources and social norms) remains understudied. Furthermore, a knowledge gap exists on the relationship between TOD intervention designs and social capital.

Altogether, it is reasonable to say that social capital is highly sensitive to changes in the built environment related to TOD. But the impacts of TOD on social sustainability depend to a great extent on the context. TOD projects create new public spaces and transform pre-existing ones, thus having an impact on communities that goes beyond individual transport or land use interventions. These projects thus have the capacity to foster eco-friendly behaviours (i.e. related to urban mobility) and shift social norms and perceptions related to active transport and lifestyles preferences (i.e. car dependency and preference to live in low-density suburban areas). Therefore, the design of appropriate interventions that takes the social context into account may further increase the overall sustainability outcomes of TOD interventions.

However, the ways and extent to which TOD could influence communities' social sustainability have not been fully realized. First, some TOD projects are merely 'transit-related' interventions (Boarnet and Compin 1999). Second, many projects labelled as 'transit-oriented' often entail local goals that go beyond those of TOD, such as fostering economic growth, building a location brand or satisfying political interests (Cervero et al. 2002; Baumann and White 2012; Dorsey and Mulder 2013). Hence, the process of planning and implementing TOD is not always aligned with social sustainability. There are competing interests that hamper adequate prioritization of social and cultural preferences (Cervero et al. 2002; Turner 2012; Dorsey and Mulder 2013). The traditionally narrow priorities based on utility-maximizing rational present poor awareness of the nexus between TOD and place making (Ndebele and Ogra 2014) and little integration of environmental and social considerations (Baumann and White 2012). TOD designs often focus predominantly on physical and functional requirements (Belzer and Autler 2002). One example of this is the development of large-scale TOD projects that do not necessarily increase equity nor welfare (Winston and Maheshri 2007; Chiu et al. 2011). Also, unsuccessful TOD projects have been related to lack of information on travel-related attitudes prior to the intervention (Bailey et al. 2007; De Vos et al. 2014), a critical success factor for low-income neighbourhoods (Bailey et al. 2007). Ecosystem services and local values are not always integrated into urban and transport planning, mostly due to inefficient public participation processes and unstructured stakeholder involvement (Soria-Lara et al. 2015). Consequently, social unacceptability and designs at odds with the local needs occur (Kathryn Scott 2000; Assefa and Frostell 2007). The intransigence of the target community on changes in lifestyles may lead to unintended consequences. For example, the introduction of measures to avoid car usage (i.e. inner-city parking fees) may result in new suburban driving patterns, protests, and induced technological innovations that hamper social

changes and, ultimately, sustainable development (i.e. the rebound effect) (Clark 2005; Vallance et al. 2011). In sum, TOD faces a wide nature of challenges and uncertainties, which frequently end up in underprioritization of community's interests (Belzer and Autler 2002; Dorsey and Mulder 2013) and suboptimal designs for social sustainability. The large-scale mass transit investment in Jakarta (Indonesia) is one example where social sustainability outcomes were affected. The differences across gender and other social groups with regards to safety and security were not addressed in the design of the projects resulting in gender gaps and other inequalities (Turner 2012). In Cali (Colombia), accessibility to the newly implemented bus rapid transit (BRT) system varies in relation to neighbourhood socio-economic strata, greatest for middle-income groups and most limited for areas with population from the highest and lowest socio-economic strata (Delmelle and Casas 2012). Workplace relocation towards mixed-use transit-oriented development in a suburban area of Lisbon (Portugal) did not trigger the expected modal shifts, indicating a lack of understanding of citizen's commuting preferences and inadequate measures to discourage workers from using their cars to commute (Vale 2013). In the wider European context, urban transport vision plans are still based on technological innovation, which devalues the importance of social innovation as a key factor for transformative changes towards sustainable urban transport, and further indicates that citizens' participation plays a secondary role in the design and decision-making process (Upham et al. 2013). Although notable progress has been made in terms of policy rhetoric in countries such as the UK and Finland, the link between participatory processes and policy outcomes remains unclear, partly because there are no explicit procedures to make it a deliberative process (Elvy 2014).

Participatory planning for TOD

As with urban sustainability, TOD governance offers great opportunities but also challenges, especially with regards to citizens, which can be resolved with stakeholder participation. While a great deal has been written about the role of participation on urban sustainability transitions and on transport planning (Mahdavinejad and Amini 2011; Proli 2011; Collier et al. 2013; Smedby and Neij 2013; Sagaris 2014), so far, there has been no research on the effects of participatory planning processes for TOD on social sustainability. (Innes and Gruber 2005) identified the following planning styles in the transit development of the San Francisco Bay area: (a) the technical/bureaucratic style, based upon neutrality, objectivity and quantitative analysis; (b) the political influence style, which pushes for a particular agenda influenced by politics and popularity; (c) the social movement style, which reflects community activism and involvement in strategic planning decisions; and (d) the collaborative style: the 'coming together' of diverse stakeholders to reach a consensus. In their research, collaborative designs showed greater public satisfaction and cost efficiency in the design of the projects compared with other approaches. Two major reasons were identified. First, there was a strong incentive to reach agreements when involving stakeholders. Secondly, building networks created additional social, political and intellectual capital, which together is most likely to produce innovative outcomes that overcome controversies and minimize uncertainties. In relation to this argument, although new technologies (i.e. GPS data) can help obtain information on intrapersonal day-to-day variability and flexibility of commuting behaviour (i.e. space, time, travel mode and travel route) (Shen et al. 2013), these patterns vary among communities, neighbourhoods and social and minority groups, and participatory processes capture better the diversity of preferences. More generally, there are new goals emerging in urban transport planning; while physical mobility is still an essential priority, the social and environmental performance of interventions is becoming more and more relevant for communities (Bertolini et al. 2008).

Urban transitions towards sustainability also benefit from stakeholder participation; it enhances deliberation and collaboration between diverse stakeholders and among public agencies, particularly in contexts of social inequalities (Hamann and April 2013). The concept of neighbourhood planning also addresses the importance of community involvement to identify, negotiate and reconcile strategic and community interests (Pinnegar 2012). Furthermore, true dialogue among stakeholders defuses adversarial processes and facilitates better and depoliticised policy choices (Bertolini et al. 2008; Faehnle and Tyrväinen 2013). Such planning approaches enhance the collaboration between governmental authorities, and their awareness and efficiency in addressing environmental and social externalities (Taylor and Schweitzer 2005). In the case of TOD, as they create tangible urban transformations, active inclusion of citizens' views could further reinforce transformation trends across diverse scales, not just through changes in the built environment. Participatory planning for TOD helps achieve lifestyles, social preferences and behaviours aligned with sustainability principles. In Medellin (Colombia) citizens' empowerment in the design, implementation, handing over mechanisms and evaluation of TOD plans strengthened democratic processes in the most conflict-prone neighbourhoods of the city (Brand and Dávila 2011; Dávila and Daste 2011; Rodriguez Herrera 2012). The participatory design of TOD in a low-income urban neighbourhood of Louisville, Kentucky (US) helped to integrate local preferences resulting in a positive response from the community which was willing to change its travel behaviour (Bailey et al. 2007). In Santiago (Chile), self-organized citizen participation generated transparent processes favouring sustainability and democratization

and fostered innovation in urban and transport planning (Sagaris 2014).

The institutional feasibility of participatory planning through political and social frameworks and methodological practices has now reached maturity (Innes 1995, 1996) and could easily be applied to the TOD case. Multiple-criteria decision analysis through analytical hierarchy process approaches serve, especially at the initial stage, to understand the biases between preferences, desires and expectations among groups (de Luca 2014). The development of local knowledge in practice-based training programmes can help construct local capacity for collaboration (Ataöv and Ezgi Haliloğlu Kahraman 2009). Visual and participatory workshops embedded into a structured public involvement (SPI) process help identify preferred planning combinations for citizens (Bailey et al. 2007). Computer support for collaborative planning also facilitates group interactions and decision-making processes. Visualization tools, from 2D geographic information systems (GIS) (Coors et al. 1999) to recently developed 3D visualization and modelling programmes, help in managing complexity in communication (Bailey et al. 2007; Neuenschwander et al. 2014). The design of participatory TOD planning processes can thus be achieved with relatively little effort.

Conclusion

Public interventions that change urban spaces like TOD also alter social sustainability. TOD improves the quality of public spaces and urban connectivity and accessibility, which enhances urban mobility and fosters social networks. Appropriate transit, land use mix, and public space design is fundamental to the social outcomes of TOD interventions. It would therefore be useful to use participatory planning processes to maximize the social outcomes of the interventions. But the potential of making citizens feel part of the projects that shape communities remain underdeveloped, even though the community's perception is a key in optimizing public interventions. Participatory planning processes could multiply the social benefits related to TOD, such as increased transparency, trust, social inclusion, collective action and social networks, and further act as a catalyser of urban sustainability.

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