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Good practices for advancing urban mobility innovation: A case study of one-way carsharing

Clara Terrien [a,*], Rémi Maniak Ph.D. [b], Bo Chen [b], Susan Shaheen Ph.D. [a,c]

[a] Transportation Sustainability Research Center, University of California Richmond Field Station, 1301 S. 46th Street, Building 190, Richmond, CA 94804, United States
[b] i3_CRG - CNRS - Ecole Polytechnique - Université de Paris Saclay, Route de Saclay, 91128 Palaiseau, France
[c] Civil and Environmental Engineering Department and Transportation Sustainability Research Center, University of California, Berkeley, 408 McLaughlin Hall, Berkeley, CA 94720, United States

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ABSTRACT

Transforming urban mobility requires integrating public with private services into a single transportation system. Local governments and private companies face the challenge of how to coordinate themselves. An emblematic example is one-way carsharing (shared use of a fleet of vehicles that are typically free-floating throughout an urban area).

Surprisingly, good practices for public and private players innovating together remain relatively undocumented. This paper proposes a systematic and balanced public-private approach to foster transportation innovation management. We review both public policy and business management literature and build a framework to help governments and companies collaborate (organizational structures, project management processes, and profitability assessment tools).

We use this framework to examine both public and private experiences through a case study analysis with five one-way carsharing services in Europe (Paris, Munich) and the United-States (San Francisco, Portland, Seattle). For each we conducted expert interviews with the government and the private operator. This paper provides recommendations for both sectors. First, public and private players should have specific organizations, separated from the core business. Second, they should co-manage innovation since pilot projects lack certainty and require risk management. Third, a new approach to value emphasizing the role of project learning and capability building is necessary.

1. Introduction

For decades, experts have emphasized the need for a more sustainable urban transportation system. However, figures have pointed in a contrary direction. In 2011, the International Transport Forum forecasted that the number of cars worldwide would triple from 850 million to 2.5 billion by 2050 (OECD/ITF, 2011). As a result, electric mobility, shared, connected, and automated innovations have been emerging for decades. Carsharing is a good example. It draws on modern technology to enable access to auto-based mobility without the consumer owning the physical asset (a car) (ACEA, 2014). Consumers can rent cars on a short-term, as-needed basis, paying only for the time they use the car and the mileage they drive. Carsharing remains a niche market at the global scale. The University of California, Berkeley's Transportation Sustainability Research Center found in fall 2014 that the global market for carsharing was 4.8 million members and 104,125 vehicles (Shaheen & Cohen, 2015).[1]

Technological advancements are accelerating the transition toward sustainable mobility. For example, the automated vehicle is becoming a reality. As of mid-June 2015, 77 vehicles from eight manufacturers have been issued autonomous testing permits by the California Department of Motor Vehicles (Harris, 2015). Governments and companies have started operating pilot projects integrating automated driving within public space. EasyMile is partnering with the Contra Costa Transportation Authority on a pilot project in San Ramon, California. A fleet of self-driving buses will shuttle workers around a sprawling East Bay office park starting in 2016. CityMobil2 implemented its first automated road transportation system demonstration in Torregrande in Italy from July to September 2014. These projects are characterized by a

* Corresponding author.
E-mail addresses: cterrien@berkeley.edu (C. Terrien), remi.maniak@polytechnique.edu (R. Maniak), bo.chen@polytechnique.edu (B. Chen), sshaheen@berkeley.edu (S. Shaheen).

[1] Worldwide member-vehicle numbers are collected through expert estimates and industry benchmarking through national and regional carsharing associations. In select circumstances, the authors augment data provided by national associations with data from large, nonmember operators to obtain a more accurate estimate. In North America and in smaller markets with a limited number of operators, the authors collect member/vehicle data from each organization.

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strong cooperation between public and private players. In Torregrande, MLab coordinated the activities for the demonstration; the Comune di Oristano provided the infrastructure adjustments and customer services, while the local transport operator, Trasporti Regionali della Sardegna, installed the stops and shelters and provided the on-board supervisors needed to comply with the requirements of the Italian Ministry of Transport.

Game-changing innovations in passenger transport require effective public-private collaboration (Dowling & Kent, 2015, Osei-Kyei & Chan, 2015). On one side, many cities aim to foster car-free areas as a step toward their smart city strategy. But getting rid of cars requires them to provide citizens with access to reliable and dense transportation networks. On the other side, private companies (e.g., OEMs, service providers, startups) aim to bring innovative transportation products and services to market. But, most of the time, they fail to reach mainstream customers. How can public and private players successfully manage change together in urban mobility? Driving change requires new organizations, processes, and tools. This paper explores good practices for both local governments and companies.

The public policy literature explains that governments can protect innovations through public procurement rules, tax incentives, or subsidies (Kemp, Schot, & Hoogma, 1998; Smith & Raven, 2012). Local governments can shape carsharing services through parking regulation (e.g., allocation of parking spaces for carsharing vehicles) (Dowling & Kent, 2015). The success of carsharing services results from partnership arrangements between private carsharing companies and the local government. Studies on public-private partnerships have highlighted critical success factors for their implementation and operations (Osei-Kyei & Chan, 2015). One key success factor is a stable and enduring public-private relationship (over 10 years). The public policy literature has also explained that a multi-modal transportation system integrating public transport with innovate private modes has the potential to reduce car ownership and increase the use of public transit (Shared-Use Mobility Center, 2016). However, the public policy literature leaves relatively unanswered how concretely local governments adapt themselves and build long-term relationship with private players.

The business management literature has focused on management practices (organizational structures, project management processes, and profitability assessment tools) to help private companies scale up their innovations. The so-called "ambidexterity" literature (theory focused on growing current businesses, while launching breakthrough innovations) suggests incumbents should detach innovation structurally from the core business (Benner & Tushman, 2003; Christensen, 1997; Danneels, 2004). Innovation projects are important drivers in building new competencies, capabilities, and assets (Maniak, Midler, Beaume, & von Pechmann, 2013; Teece, Pisano, & Shuen, 1997). Key performance indicators have therefore shifted from cost control to a deeper understanding of the strategic value generated (Brady & Davies, 2004; Shenhar & Dvir, 2007). However, not much has been written about how companies collaborate with public players to roll out transportation innovations in public space.

In this paper, we focus on one-way carsharing. One-way carsharing does not require its users to return the vehicle to the same location from which it was accessed, and it allows for self-service vehicle access on a 24-hour basis for short trips. As a result, one-way carsharing companies and local governments have to collaborate on access to public space and parking. Transportation studies have made a significant contribution on optimizing service operations and quantifying their environmental impacts so far (Shaheen, Chan, & Micheaux, 2015). However, recommendations on how local governments and private players organize themselves and collaborate to launch a one-way carsharing service are needed. To explore this empirically, we rely on both public and private experiences of five one-way carsharing cities in Europe (Paris, Munich) and the United-States (San Francisco, Portland, Seattle). For each service, we analyzed secondary data and conducted expert interviews with the local government and the private operator. Our objective is to understand how local governments organize themselves and collaborate with private players to advance change in urban mobility. Before discussing the case studies, results, and their implications, we first present our synthesis of the public policy and the business management literature. Next, we describe our methods and data collection.

2. Literature review

The transportation literature has explained how to optimize service operations and quantify environmental impacts. To help us address the issue of how public and private players can foster urban mobility together, we review both public policy and business management literature and identify key success factors. The public policy literature has focused on the definition of public policies, management of public-private partnerships, and the integration of public and private transportation modes. The business management literature suggests management practices to help companies bring innovations to market. We integrate both areas of the literature into a single framework that consists of three dimensions: organizational structure, project management processes, and profitability assessment tools.

2.1. Transportation literature

One-way carsharing is a rapidly-emerging model with unique operational challenges. Research in the field has contributed to optimizing service operations and quantifying environmental impacts.

At present, there are several carsharing models (Shaheen et al., 2015): 1) roundtrip carsharing (vehicles are accessed and returned to the same location), 2) peer-to-peer carsharing (shared use of privately owned vehicles operated by a third-party organization), and 3) one-way carsharing. There are two one-way carsharing approaches: free-floating and station-based. Free-floating allows vehicles to be picked up and left anywhere within a designated operating area, while station-based requires users to return vehicles to an available station. Today, there are an estimated 17 operators with one-way carsharing services launched in 10 countries (Shaheen et al., 2015).

The flexibility offered by one-way carsharing makes its management particularly complex. Studies have suggested simulation models as key success factor for optimizing service operations. These models aim to assist decision makers and minimize costs while maintaining member satisfaction. One-way carsharing presents unique challenges, such as vehicle rebalancing and parking management. The natural imbalance of vehicle stocks is caused by the uneven pattern of trips during the course of the day. In classic transport systems, the directional capacity is offered to clients irrespective of the existing demand. In one-way carsharing, demand can completely change the system's supply in ways that are hard to predict (Jorge & Correia, 2013). The need to guarantee a level of vehicle availability coupled with an imbalance between stations could lead to an oversized fleet and underused vehicles (Firnkorn, 2012). According to Nakayama, Yamamoto, and Kitamura (2002), one-way systems need around twice as many reserved parking spaces as vehicles to function optimally. Models have been developed to determine the: 1) optimum fleet size, station location, size, and number (Cepolina & Farina, 2012; Correia & Antunes, 2012); 2) best strategy when demand changes (Fassi, Awasthi, & Viviani, 2012); 3) most efficient vehicle relocation systems (Jorge, Correia, & Barnhart, 2014); and 4) trip pricing strategy (Jorge, Molnar, & Correia, 2015).

Studies have quantified environmental impacts of sustainable transportation. One North American study of 9500 people who participated in roundtrip carsharing programs in the US and Canada documented numerous impacts (Shaheen & Chan, 2015). In aggregate, 25% of members sold a vehicle due to carsharing, and another 25% postponed purchasing a vehicle, leading to one carsharing vehicle replacing nine to 13 vehicles among carsharing members (on average) due to personal vehicles sold or postponed vehicle purchases. This reduction in vehicles

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