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Cargo Bike Sharing: The Potential of a new Socially Innovative Mobility Service for Metropolitan Regions and Beyond

Michael Bissel ^{a *}

^aTechnische Universität Berlin, Germany

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This work addresses the following topic(s) from the Call for Contributions:
(Please check at least one box)

- Placemaking to integrate urban spaces and mobility
- Promoting sustainable mobility choices in metropolitan regions
- Governing responsible mobility innovations
- Shaping the transition towards mobility justice
- System analysis, design, and evaluation
- other: _____

Extended Abstract

Problem statement

To address the manifold ecological, social and economic challenges of the transport sector, innovative mobility solutions are needed (Vergragt & Brown, 2007). Recent years have brought a wide range of technological innovations in the automotive sector (e.g., car sharing or electric vehicles). However, several scholars question the ability of technological innovations alone to achieve the required decarbonization (Lange & Santarius, 2020; Moulart et al., 2014). For instance, car sharing could function as a “gateway drug” to car ownership (Giesel & Nobis, 2016) and production of cars alone is resource intensive (Bieker, 2021). Thus, it seems useful to not only reduce car use but also the number of privately owned cars (Rammler, 2018). Promoting active mobility and sustainable alternatives outside of the “automobility system” (Urry, 2004) therefore appears reasonable.

One approach to reach this objective is to promote the diffusion of cargo bikes (CBs). CBs are special bicycles for transporting goods or children (Becker & Rudolf, 2018a). These use cases are typical reasons for choosing cars (Carracedo & Mostofi, 2022). Studies indicate that (electric) CBs lie between bikes and cars in terms of important attributes such as cost, payload, and range (Gruber et al., 2014). For these reasons, CBs are considered a promising alternative to car use and ownership (Börjesson Rivera & Henriksson, 2014; Pearce, 2016). Metropolitan regions are ideally positioned to test this kind of innovative mobility services (Hess & Schubert, 2019; ICLEI, 2017). In recent years, popularity of CBs increased and a number of cargo bike sharing (CBS) operators emerged that facilitate the use of CBs (Becker & Rudolf, 2018b). A special form of CBS, Commons Cargo Bikes (CCB), can be categorized as social innovation and niche experiment (Bissel & Becker, 2023).

However, there exists limited research on CBs and CBS in general (Hess & Schubert, 2019; Riggs, 2016). Particularly, research gaps refer to the environmental impact of CBS with regard to its potential to reduce car ownership, to user structure and user behavior in different geographical contexts (i.e., rural vs. urban context) as well as to changes regarding user structure and behavior over time (i.e., seasonal effects and long term trends).

* Corresponding author. Tel.: 0162-641-8113;
E-mail address: michael.bissel@campus.tu-berlin.de

Research objectives

In view of the research gaps outlined in the previous section, this contribution investigates the scaling of CCB and analyzes the car ownership impact of CBS as well as perceived gaps between CBs and cars based on new empirical data. Furthermore, with regard to geography, differences between metropolises and rural context are analyzed and, in terms of temporal aspects, differences in user structure and behavior over time are investigated.

Methodological approach

Our analyses build on the combination of two large datasets. Firstly, a large-scale empirical survey with CCB initiatives was conducted following a transdisciplinary approach. Data was collected from June to August 2022. In total, 2,590 CBS users from 58 CCB initiatives completed the survey. These initiatives are located in different geographical contexts and thus can inform about CBS in rural as well as urban regions (Bissel & Becker, 2023).

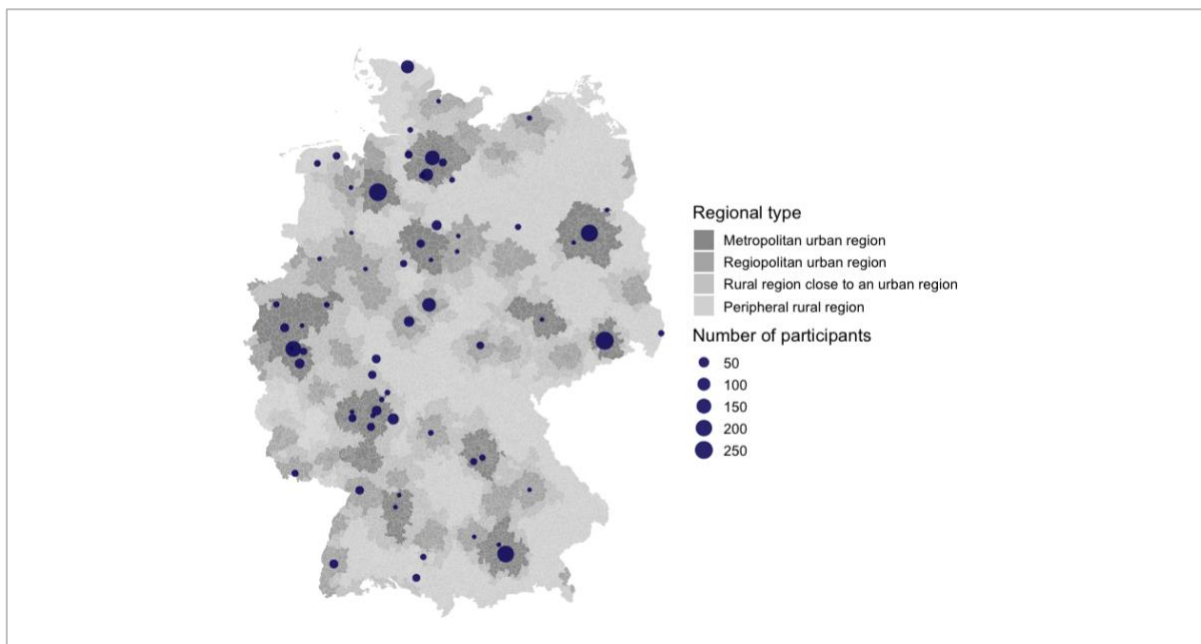


Figure 1: Overview of participating CCB initiatives in the research project underlying the first dataset

Secondly, booking as well as survey data from the largest CCB initiative, fLotte Berlin (Bissel & Becker, 2023; Carracedo & Mostofi, 2022), were analyzed. This data was collected over the course of five years. Survey data were collected as a follow-up survey after each booking. This procedure allows for temporal as well as geographical analyses as well as in-depth insights on CBS in metropolitan regions. Thus, geospatial analyses as well as time-series analyses were conducted.

(Expected) results

Firstly, our results indicate that CCB successfully scaled out in the past decade. The movement experienced numerical and geographical diffusion as the number of initiatives rose from 46 in 2016 to 170 in 2023. These initiatives spread over different regional types. In addition, more than 1,100 CBS as well as close to 100,000 users and more than 50,000 annual borrowings from the initiatives in our sample underscore the size and growth.

Regarding the car ownership impact of CBS, the results imply a substantial potential of CBS to contribute to car ownership reduction. We find evidence that car ownership is reduced by a rate corresponding to 7.4 to 18.1% of the active sample due to CBS, depending on the causality definition. The largest share relates to users deciding against purchasing a car. However, a substantial number of participants also actively reduced car ownership. Thus, this study complements findings on car use substitution of CBS (Becker & Rudolf, 2018a).

With regard to gaps of CBs compared to cars, CBs are rated superior in regard to affective, symbolic, and environmental motives as well as on flexibility and price. However, discrepancies to cars do exist in terms of other instrumental aspects (traffic safety, travel speed, comfort, weather-independence). Notably, users who reduced car ownership tend to rate CBs superior compared to car-dependent users.

Regarding geographical differences, analyses indicate similar relative demand for initiatives of different sizes and local contexts. Thus, CCB was proven to be a viable concept beyond urban metropolises. In terms of temporal differences, time-series analyses indicate seasonal effects with regard to overall demand. Precisely, demand for CBS is higher in summer than in winter. Notably, the share of heavy users is higher in winter.

Overall, the results imply that cargo bikes can play a marked role in reducing car dependency. Improving infrastructure and cargo bike technology as well as stimulating favorable social norms for cargo bikes have been identified as beneficial conditions that could help to leverage this potential.