A Dust Buster? The Effect of Social Influence and Incentives On Mobility Behavior During Smog Alarm

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Abstract. For cities, it is cruicial to solve their mobility issues. One of the approaches is to convince people to use more sustainable means of transportation. This research investigates the effect of social influence and financial incentives in the state of "particular matter emergency" in Stuttgart, Germany. Preliminary results show an increased awareness, a reduction of cars on the road and increased ticket sales for public transit and increased usage of a electric car-sharing services.

Keywords: behavior change, mobility, particular matter

1 Introduction

Mobility is one of the biggest challenges for cities at the moment. Cities all over the world are not only creating new ways of transportation [1], they also try to change their citizens' behavior with different carrot-and-stick-approaches. Cities are, for example, restricting car use by limiting car-access to their centers [2], [3]. Other cities have tried to convince people to switch from private automobile to public transit. In some cities, public transit has even been offered for free. However, success of these interventions has been limited [4], [5].

Methods of persuasion are potentially helpful to encourage a shift of transportation modes. It has been shown in behavioral psychology that the motivation to perform certain activities is an important driver for one's behavior [6], [7]. Extrinsic motivation refers to external factors like tangible rewards or the avoidance of pressure [8]. These factors can potentially be influenced by cities. A major source of pressure can be of social nature, i.e. pressure from other persons or groups [9]. This kind of social influence is a phenomenon that is well-known in psychology [10]. Interventions addressing social norms can even influence behavior in situations that are a threat for a community, e.g. in the case of water scarcity [11].

Thus, it can be assumed that a combination of financial incentives and social influence could cause a change in mode choice behavior towards more sustainable modes – at least when a community experiences threat like bad air quality. This assumption is investigated in a case study in the city of Stuttgart (Germany).

2 Case Study

Stuttgart is considered to be the German city that is most affected by particulate matter [12]. Since the beginning of 2016 the city administration can declare a state of "particulate matter emergency" whenever the German Weather Service predicts weather conditions that are favorable for high particulate matter concentrations. In this case, the authorities encourage the population not to use the car. The information is spread on different channels like radio, television, social media. Posters with statements like "A ban on vehicles saves lives" or "We are suffocating" are placed in the city. Also, signs inform car drivers about the emergency state and invite them to use public transit (see Fig. 1). City officials made clear that it is everybody's responsibility to contribute to a reduction of pollution. The administration also announced that a ban on vehicles will be imposed if the city's goals are not met.

Fig. 1. Influencing signage [15]

In addition to these socially influencing interventions, we are offering financial incentives to encourage more sustainable mobility behavior at car2go (the world's largest operator of free-floating car-sharing services [13]) and moovel (a route planning app for different modes of transportation [14]): tickets for public transit are offered on the moovel-app for half the price [15]. Also, trips with one of car2go's electric car-sharing vehicles are offered with a 50 per cent discount [16].

The state of particulate matter emergency was first declared on January 18, 2016. It ended on January 21, 2016. The news was spread widely. On Twitter, the hashtag #feinstaubalarm (particular matter emergency) ranked 2nd in Germany [17].

3 Preliminary Results

It seems that the first emergency state in Stuttgart's history had only limited influence on car traffic. A first assessment revealed a reduction of car traffic by three to seven percent. Also, the goals in terms of particular matter concentration were not met. However, the increased awareness for the problem of particulate matter was considered as a positive result [17].

From the perspective of car2go and moovel, a shift in behavior was visible: ticket sales via moovel and usage of car2go increased significantly. However, the number of car2go and moovel users are low compared to the total amount of travelers – so the impact on traffic on a city-level is limited. It is also possible that the reason for the increase in car2go-usage and moovel ticket sales is a shift away from other ticket resellers to these operators or even away from more sustainable modes of transportation (e.g., walking or cycling). This will be subject to further investigation.

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