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Item Type	Meetings and Proceedings
Authors	Catulli, M.;Cook, M.;Potter, S.;Valdez, M.
Citation	4th PLATE 2021 Virtual Conference, 26-28 May 2021;
Download date	2026-09-25 16:39:50
Item License	https://creativecommons.org/licenses/by-nc-sa/1.0/
Link to Item	https://hdl.handle.net/10344/10169

Mobility as a Service: sharing rides in times of pandemics

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Keywords: Consumer Culture; Consumer Practices; Sustainability; Transport.

Abstract: This paper discusses how pandemics might shape future transport practices and affect consumer trust in shared mobility offerings such as *Mobility as a Service* (MaaS). MaaS is a personalized one-stop transport management platform, digitally unifying trip creation, purchase and delivery across all transport modes. The discussion draws on research into a case study featuring an electric car club.

Results of the research show that consumers are more or less likely to use MaaS depending on their age and lifestyle. Relationships between users, strict protection measures and a sense of belonging to a geographically situated or a brand community could engender trust in the MaaS provider and in other users within selected pools of users. MaaS providers could therefore encourage users to aggregate around communities coalescing around sharing cities or brands. Important areas of future research are in the utility of health and safety measures and of social and symbolic cues in reassuring consumers of MaaS' safety and in the consumer identities that are more likely to aggregate around either types of communities.

Introduction

This conceptual paper draws on pre-covid research on factors affecting the acceptance of vehicle sharing by potential users, which is used as a point of departure to explore directions for research into the impact of the coronavirus pandemic (C19) on how Mobility as a Service (MaaS) is perceived by and incorporated (or not) into the practices of potential users. The MaaS concept is a "personalised, one-stop transport management platform, digitally unifying trip creation, purchase and delivery across all modes" of transport. MaaS offers "total integration across public, intermediate (such as taxi and ride share) and private transport" (Ho et al., 2018, 303). MaaS has attracted considerable attention from academics and policy makers because the benefits of technological advances (e.g., improved vehicle efficiency and emission standards) are not enough to prevent the potential environmental catastrophe caused by current transport practices with their ever-increasing number of vehicles and miles travelled (Frey, 2018). Proponents claim that MaaS delivers environmental benefits by encouraging walking and cycling, improving utilization rates and reducing single occupancy

ridership (Jittrapirom et al., 2017). Therefore, MaaS offers potentially more sustainable transport than private cars but its success depends on the users' acceptance of vehicle sharing as an alternative to exclusive ownership. Pre-pandemic trends suggested that the transport landscape was becoming increasingly receptive to MaaS, with research showing declining car ownership and increasing use of shared vehicle offerings by younger consumers (Nicola and Behrman, 2018).

However, pandemics, which Leach et al. (2010) associate with climate change, might severely affect diffusion of MaaS (Brzeski and Cocuzzo, 2020) and C19, a viral *infection*, is a current example. A viral infection is a proliferation of harmful viruses inside a human or animal organism (Vilchez et al., 2002). Infection can diffuse by *contagion*, the communication of infection to others by direct or indirect contact (Vanderweele et al., 2012). Hygiene behaviour and culture form an interlinked adaptive system, a 'behavioural immune system' (Curtis et al., 2011, 389) for protecting humans from contagion through disease avoidant behaviour. Such behaviours are also plastic, being able to retune according to signals and cues of risk of

contact with pathogens, including those from social environment. Contagion avoidance behaviours are therefore inflected by a series of highly specialized learning mechanisms and biases (Ibid).

Recent research suggests that users of MaaS may fear infection from shared transport offerings and might doubt whether service providers and other users followed adequate rules of hygiene management to reduce risk of C19 infection (Beck and Hensher, 2020). Indeed, Kanda and Kivimaa (2020), Li et al. (2020) and Gaglione (2020) suggest that travellers might consider private cars, bicycles and other forms of micro-mobility (e.g. electric bikes and electric scooters) safer than shared transport which involves close proximity to strangers in confined spaces. Indeed, in many countries, a high proportion of people refrained from using public transport, which includes buses, trains and trams, partly to comply with transport restrictions (Wren-Levis, 2020) and possibly for fear of infection (Beck and Hensher, 2020). This caused losses in ticket revenues (Kanda and Kivimaa, 2020). In the UK, electric car sharing initiative *e-carclub* witnessed a fall in demand for their vehicles due to C19, had to reduce their service and bear the costs of disinfection, which affected profitability (ecarclub.co.uk, 2020).

Ultimately, contagion-avoidance behaviours associated with C19 may entrench mobility practices (Gartman, 2002) based on car ownership. This paper draws on lessons from pre-covid car sharing to explore how pandemics might shape future transport practices and how consumers may trust shared mobility offerings despite uncertainty of whether they present risk of C19 infection. This in turn might shed insights into how MaaS operators could better prepare for pandemics and inform transport policies to help compensate economic impacts of pandemics such as C19 (Wren-Levis, 2020).

System shocks and changes in mobility practices

In consumption practices (the routines by which consumers secure assets for use (Spaargaren, 2013), exclusive ownership is increasingly being replaced by access, with consumers paying to obtain products or services for a short period (Rifkin, 2000; Barbu et al., 2018) as their preferred mode of consuming durable goods (Belk, 2014; Eckhardt and Bardhi, 2019). Through access, consumers share use of goods, which they release after use so that they

can be shared with other consumers. Sharing has been defined as "the *simultaneous* or *sequential* use of an object (e.g., car), a space (e.g., living room), or an intangible (e.g., identity) by more than one individual" (Rudmin, 2016, emphasis ours). In the case of transport, car clubs are based on a model of sequential use: members of the club make use of the same car at different times during the day and are not likely to be in close proximity to each other at any time. In contrast, users of ridesharing services that connect people traveling in the same direction share vehicles simultaneously - rideshare models require that users travel together to share costs. So pervasive are these business models in current consumption culture, that they have "popularized" the notions of "sharing economy" and "sharing cities", sharing economy exemplars in urban areas (McLaren and Agyeman, 2015).

However, changes in practices and collective behaviours may results from non-institutionalized interaction and behavioural patterns that occur when there is serious or abrupt change in social or physical environment (Koos, 2017), such as a pandemic. C19 is already having profound impacts on transport practices and on the sharing economy and there is a risk that it might shape the transition from private cars to MaaS and reverse it (Kanda and Kivimaa, 2020). Car sharing, a crucial element of MaaS, may be perceived to present a high biosecurity risk (Hensher, 2020). Users might be encouraged to select options such as shared bicycles and electric scooters from the MaaS mix, which are often considered "safer", as they do not require sharing an enclosed space (Serafimova, 2020; Hensher, 2020). Ultimately, however, consumers perceive private cars as having a lower biosecurity risk than any sharing model (Ibid.). The next section outlines methods we use to investigate the role that disease-avoidant behaviours may have on the willingness to adopt vehicle-sharing practices, which are a crucial element of MaaS.

Methods

This research is based on data collected from policy and trade literature and from interviews conducted as part of a case study, *e-carclub*, an electric car sharing system funded by the *National Energy Foundation* and *Sustainable Venture* (e-carclub.co.uk, 2015). Car clubs are a key MaaS component (Catulli et al., 2020). Pre-pandemic research on the consumer practices associated with car clubs and the factors affecting the willingness to adopt

vehicle-sharing practices (see *Ibid.*) is used here to suggest approaches for investigating the effect of Covid-19 on MaaS, and potentially to identify approaches for managing its impact.

A convenience sample of nineteen participants was selected and semi-structured interviews supported by interview guides were conducted with these participants across three sites, *Future Wolverton* (FW), *University of Hertfordshire* (UH) and *Watford City Hall* (WCH). Five participants were professionals from Wolverton, a town of about 19,000 people located within Milton Keynes (Visionofbritain.org), six (three students, two academics and one technician) were from UH and eight, who were all professionals, from WCH. Participants were divided evenly by gender. The majority of participants (15 out of 19) were car owners and were contacted through e-mail with the support of the local e-carclub branches. The interviews were audio recorded and transcribed. Data were analysed using NVivo, a qualitative analysis software. A flexible template (Miles and Huberman, 1994) was used to generate initial codes from literature on consumption of car clubs following an abductive logic, additional codes were generated by induction.

Findings

When they explained why they did not use e-carclub, participants listed a number of reasons. Of particular interest, for this research is their claim that they had little trust in other users to return the vehicle clean and undamaged and stated that they had found their booked vehicle damaged and not fully charged. More generally, users of e-carclub stated that they did not want to see traces of previous drivers, such as takeaway food boxes and dangerous materials in cars – indeed, a participant reported that he had found asbestos sheets left behind in a car, possibly a leftover of house renovation work. In some respect therefore, contagion avoidance had emerged as a theme in car clubs research long before C19 (cf. Bardhi and Eckhardt, 2012). Importantly, the cues that trigger disease-avoidance responses are not only physical, but are often social, symbolic and subject to biases (Curtis et al., 2011). For instance, participants even disliked finding the radio tuned to a station different from their favourite, as this was a trace of other users' identities.

Although the majority of participants rejected e-carclub, younger consumers, including students, used it. Users stated that use of e-

carclub freed them from responsibilities such as parking, maintenance and insurance. Importantly, users also reported how they felt they belonged to a community of likeminded users, who aggregated around local providers of e-carclub services. For example, some users in Wolverton stated that they felt affinity to Wolverton's local community, knew other users and had confidence in FW to guarantee the service. Participants said that the endorsement of Wolverton's local authority encouraged them to try the car club. In the users' words, the local character of the car club offering, associated with the e-carclub brand had an important role in engendering trust. This sub-set of users, therefore, did appreciate a social dimension to e-carclub, which was instrumental to generate trust. While these observations took place before the pandemic, such group dynamics may suggest useful mechanisms for increasing the acceptance of MaaS post-covid. The perception that there is a lot of disease about (i.e. sickness in others) may be expected to result in negative responses to members of other groups who are perceived as harbouring unfamiliar diseases, and also predicts more positive responses towards one's own group (Curtis et al., 2011).

Discussion

Before C19, a majority of participants resisted offerings such as car clubs and exhibited a reluctance to risk contagion through sharing vehicles, however, a minority of users – younger people for example – adopted e-carclub, an element of MaaS as explained in Section 3. Evidence suggests that the lockdown and transport reduction rules following C19 resulted in a reduction of use of MaaS components such as car clubs and bicycle sharing because of the reasons explained in Section 2, possibly even dissuading the minority who used e-carclub, which saw reduction in demand.

C19 concerns are likely to have different impacts on providers of sequential and simultaneous sharing services and the preliminary research discussed in section 4 suggests different management approaches. We observed that users of car clubs, which use a sequential sharing model, might have their disease avoidance behaviours triggered by symbolic and social cues. Hensher (2020) suggests that when users share a car sequentially, it might be possible to schedule time for disinfection of the vehicle between one user and the next but our research suggests

that symbols and cues may be almost as important as actual disinfection. Indeed, e-carclub attempts to reassure vehicle users that they are protected from C19 infection, by declaring on their web site that it has set up thorough cleaning operations between uses (ecarclub.co.uk, 2020). Other MaaS providers, such as *Enterprise Car Club*, a division of Enterprise car rental that collaborates with bicycle company *Brompton* and a transport app designer, set up a “cleaning pledge” to ensure safety in response to C19 (Enterprise Car Club, 2021).

When users share a car simultaneously, disinfection becomes unfeasible and trust in the safety of the service would depend on trust between users sharing vehicles. This trust may hinge on the relationship between users, strict protection measures or, possibly in future, verifiable vaccination certificates voluntarily submitted when subscribing to the service and data sharing with public authorities (Serafimova, 2020). A sense of belonging to a community, as seen in section 4, might help achieve trust within a selected pool as proposed by Hensher (2020) and Curtis et al. (2011). These communities could be geographically situated and associated with sharing cities (McLaren and Agyeman, 2015), as exemplified by Wolverton in the e-carclub case study. Alternatively, consumers could aggregate around “specialized, non-geographically bound” *brand communities* (Muniz and O’Guinn, 2001, 412), which would shape their own practices. A brand is a distinguishing name and/or symbol, logo, trademark, or pack design, intended to identify products and services of one seller or a group of sellers and to differentiate their products or services from those of competitors’ (Aaker, 1991,7). A brand community is based on a structured set of social relationships among admirers of a brand (Muniz and O’Guinn, 2001). A sense of belonging to such communities might partly reassure users to trust other users and the MaaS provider and be a focal point for the selected pools of users proposed by Hensher (2020). Brand community effects supported consumption of a sharing offering of infant mobility products, which are linked to very emotional times in users’ life (Catulli et al., 2017). In short, MaaS providers could encourage user communities to aggregate around sharing cities or brands.

Conclusion

This contribution questions whether the change of practices away from ownership of cars could be reversed by the C19 shock because alternatives such as sharing vehicles and rides may be unsafe and approaches such as MaaS, with significant potential to move societies toward more sustainable mobilities, may not be taken up. Change in practices following C19 might re-entrench transport practices based on owned products, e.g. cars, bicycles, scooters and so on – and away from MaaS.

An important area of research therefore is around the utility of health and safety measures and of social and symbolic cues in reassuring consumers of MaaS’ safety and the consumer identities that are more likely to be receptive to these strategies. Socially aggregating users around a locally situated or a brand community might encourage some types of consumers to return to MaaS. Research could investigate when a local community works better than a brand community and vice versa and what type of consumers are more attracted by each.

Whether car sharing or ride sharing work better as MaaS components with C19 is another relevant research question, because whilst with ride sharing consumers can ride with people they know and trust, with car sharing, providers need to identify alternative ways to encourage trust in the MaaS offering. A final direction for research is around strategies to encourage users to book healthier, greener options from the MaaS mix.

Acknowledgments

We are grateful to the Research and Development Management Association (RADMA) for support in data collection.

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