Is it who you are or what you do? Insights for Mobility as a Service from research on a car club

Maurizio Catulli[1]

University of Hertfordshire, Hatfield, AL10 9AB, UK, m.catulli@herts.ac.uk

Stephen Potter

The Open University, Walton Hall, Milton Keynes, UK MK7 6AA

Matthew Cook

The Open University, Walton Hall, Milton Keynes, UK MK7 6AA

Abstract

The concept of *Mobility as a Service* (MaaS) is for a personalised, one-stop travel management platform digitally unifying trip purchase and delivery across all transport modes. MaaS has potential to reduce the environmental impact of personal mobility, yet its implementation has been hindered by challenges including consumer acceptance. There is little research on the issue, particularly in the context of existing MaaS exemplars. This paper draws on insights from research into a related concept, the *Product Service System* (PSS), which is a resource efficient system of products and services supported by networks and infrastructure. The application of findings from PSS research to MaaS may avoid duplicated efforts and offer a template for further research. The paper draws on two complementary views of PSS consumption, one shaped by consumers' choice and the other by socio-material structures. The findings suggest that whilst consumers may choose to use PSS for mobility because it defines their identities, their consumption through PSS is constrained because they are locked in the geographical configuration of social life. These insights have implications for policies to support MaaS and suggest that whilst a view of consumer choice encourages interventions such as educational communications, socio-material structures inform interventions based on structural investment.

Key Words:

Consumer Culture Theory; Environmental Sustainability; Mobility as a Service; Practice Theory; Product Service System

[1] Corresponding author

Is it who you are or what you do? Insights for Mobility as a Service from research on a car club

1 Introduction

Since motorized vehicles are important sources of both local air pollution and CO_2 emissions (Potter et al. 2011, Whittle et al. 2019), personal mobility is one of the most critical consumption domains from the environmental sustainability standpoint (Stephenson et al. 2018). Less polluting vehicles such as electric cars, which are gradually gaining acceptance (Lemme et al. 2019), have comparatively lower environmental impacts. However, EVs have substantial environmental impacts in their materials, manufacturing and disposal, i.e. not only in their use phase (Patterson et al. 2011). Therefore simply replacing internal combustion vehicles with EVs will fail to deliver sustainable transport.

An alternate promising avenue to reduce the environmental impact of personal mobility is to shift away from the use of private vehicles (Sopjani et al. 2018) to the concept of *Mobility as a Service* (MaaS) (Kim et al. 2015, Illgen and Höck 2018). The MaaS concept is for a "personalised, one-stop travel management platform digitally unifying trip creation, purchase and deliver 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) and is used to optimise the urban realm, where this is possible (Wong et al. 2020), including reducing environmental impact of travel (Jittrapirom et al. 2017).

MaaS is conceived as a means to integrate car and bicycle sharing systems, regional trains, taxis, ride hailing, ferries (Hensher et al. 2020) and air travel (Lyons et al. 2019). A key feature of MaaS are Information Communication Technology (ICT) interfaces (Liimatainen and Mladenovic 2018, Polydoropoulou et al. 2018) or platforms, which enable users to plan, book and pay for their transport, through, for example smartphone apps (Lyons et al. 2019). Such apps are software downloaded in mobile

devices through platforms such as Android or Apple Store in order to satisfy various demands (Ghose and Han 2014).

Overall, MaaS is conceived as a holistic transport service, which aims at delivering positive consumer experiences of mobility by performing the functions of finding, booking and paying for transport service options (Hensher et al. 2020). To deliver such a positive experience, MaaS needs to be far more than an app and subscription (Ibid.). Indeed, MaaS needs to encompass a quality assured service infrastructure including efficient driver-passenger matching technologies for car sharing, flexible labour supply models, subscription plans to guarantee access, large scale of operation to cater for the "last mile" and back up services to protect users from journey delays and failure (Ibid.)

Proponents of MaaS claim it offers opportunities to reduce single occupancy car ridership, improve utilization efficiency of vehicles and encourage healthier transport alternatives such as walking and cycling (Jittrapirom et al. 2017). Further, MaaS could promote wider use of EVs (Ibid.) because it avoids the high costs of ownership and at the same time can reduce the number of vehicles needed. This potentially increases sustainability (Lemme et al. 2019) by reducing material and manufacturing environmental impact.

Despite such policy benefits, examples of MaaS in use are rare (Lyons et al. 2019). The first commercially available MaaS offering, Whim (whimapp.com) was set up in Finland in 2016 (Hensher et al. 2020), and there are seven operational pilots, such as *TransitApp* in the USA and *Mobility Shop* in Germany. MaaS offerings therefore are limited to market niches (Lyons et al. 2019) and struggle to gain mainstream implementation and diffusion (Whittle et al. 2019, Li and Voege 2017).

Literature on MaaS offers some insights on this challenge. Polydoropoulou et al. (2018, 5) for example list "strong reliance of people on private cars" as a "strong barrier" to MaaS. Consumers are reluctant to

move away from car ownership, especially if they already own a car (Lyons et al. 2019). Consumers also differ in their characteristics and level of engagement with MaaS (Sopjani et al. 2018), whilst private cars are important to consumers for their symbolic value (Lyons et al. 2019). Nonetheless, there are gaps in knowledge concerning how consumers relate to MaaS (Whittle et al. 2019). Most research on MaaS (e.g. Polydoropoulou et al. 2018) tends to focus on demonstrator projects, and this fails to account for the complexity of MaaS uptake (Liimatainen and Mladenovic 2018) and generally suffers from a paucity of research on 'MaaS in use' (Jittrapirom et al. 2017).

Automobility literature antecedent to MaaS claims that, as consumers need to book vehicles to use car sharing, they are not willing to wait if a vehicle is not immediately available (Kim et al. 2017). Furthermore, use of privately owned cars for mobility is entrenched because people use their vehicles to construct their identity, to express *who they are* (Choo and Mokhtarian 2004) and to move in geographically disperse physical landscapes to perform their life activities shaped by *what they do* (Watson 2012). All these challenges may affect MaaS implementation.

Enoch et al. (2019) suggest there are similarities between the MaaS and Product Service System (PSS), a sustainable business model researched within the design discipline, yet MaaS research has not sufficiently explored these connections. With a strong focus on resource efficiency, research on PSS has generated useful insights on the value consumers expect of these comparable offerings and the challenges to PSS implementation. Like MaaS, Product Service System consumption features access to products and services. MaaS diffusion is likely to encounter similar challenges and comparing the two research streams avoids duplication of effort. Therefore, in this paper, we draw on research on PSS consumption by Catulli et al. (2017) and Catulli (2019) to provide insights on the challenges to MaaS consumption outlined above.

The research we report in this paper draws on *Consumer Culture Theory* (CCT) and *Practice Theory* (PT), the two theoretical foci of 'who you are' and 'what you do' in the title of this paper to research PSS consumption. Hence, the research explores the nexus between PSS consumers' identity construction and their performance of practices in the socio-technical landscape through PSS consumption. Both of these matter for the diffusion of MaaS, because the move away from private cars has an effect on consumers' identity projection (Lyons et al. 2019) and because MaaS consumption involves different practices form driving private cars (Durand et al. 2018.

This contribution focuses on car sharing, a type of use orientated PSS (Cherubini et al. 2015), which is a key transport option (Eckhardt et al. 2018, Surakka et al. 2018) within a MaaS bundle (Hensher et al. 2020) to attract travellers away from private cars. Indeed, researching components of MaaS such as car sharing is as useful as researching MaaS as a whole (Lyons et al. 2019). This is the rationale for the research to focus on an electric vehicle PSS – a car sharing system.

2 MaaS and Product Service Systems

The development of MaaS faces substantial challenges because it requires collaboration between different stakeholders from private and public sector (Surakka et al. 2018), such as transport and ICT platform operators, who might not trust each other for sharing data (Polydoropoulou et al. 2018). MaaS success also depends on its accessibility (number of vehicles in set locations), local built environment and provision of alternative modes, e.g. bike sharing systems (Kamargianni et al 2018). For these reasons, MaaS might have implementation difficulties where levels of digitalisation and internet coverage differ between geographical areas and countries (Surakka et al. 2018) and difficulties in achieving critical mass. This would even happen at the individual consumer level where sections of the population have poor ICT skills and internet access (Polydoropoulou et al. 2018).

Some people could not adopt MaaS as they do not own smartphones and have low digital abilities (Polydoropoulou et al. 2018). Older people for example find it difficult to adopt MaaS due to poor ICT skills (Durand et al. 2018). MaaS research assumes that consumers make travel decisions in conditions of certainty (Jittrapirom et al. 2017) and MaaS requires considerable planning by users (Durand et al. 2018). Lyons et al. (2019) underline the importance of cognitive effort required by MaaS usage as opposed to private cars for its diffusion. Furthermore, people tend not to trust sharing data with networks supporting MaaS offerings and digital financial transactions (Durand et al. 2018). In addition, the more intensive is the use of private cars, the less likely consumers are to consider MaaS (Ibid.). Therefore, existing ownership of private cars matters, although MaaS might coexist with private cars rather than replacing them, for example substituting second cars only (Lyons et al. 2019). All this contributes to attitudes favouring use of private cars (Eckhardt et al. 2018). Finally, MaaS requires personalization and customization of service to individual users (Jittrapirom et al. 2017) so they can design "journey packages" to satisfy their needs.

Enoch et al. (2019) draw a relationship between MaaS and Product Service Systems (PSS). PSS are systems of products, services, networks of actors and supporting infrastructure developed to be competitive, resource efficient and to satisfy customers (Mont 2002).

In order to account for different types of PSS in the field and levels of sustainability performance, PSS are often classified in three types (Cook et al. 2006, Tukker 2015) which Enoch et al. (2019) consider different *levels* of PSS:

1. *Product orientated* – services are added to products owned by customers, e.g. remote cartridge ink use monitoring, automatic reordering and delivery in addition to a printer purchased outright

2. *Use orientated* - customers use products without owning them, e.g. cars accessed through car sharing and leasing arrangements
3. *Result orientated* - customers purchase results/ outcomes, e.g. thermal comfort in buildings.

This three level classification is useful as PSS offerings can be arranged on a continuum from less resource efficient (product orientated) to more resource efficient (result orientated) (Tukker 2015). PSS studies have included the pooling and sharing garden tools in neighbourhoods, infant product leasing (Catulli et al. 2017) and clothing rentals (Armstrong et al. 2015), and there are many PSS offerings which take the form of automobile and bicycle sharing services (Cherubini et al. 2015). Seen in this way, MaaS can be considered as a particular type of PSS offering.

According to Enoch et al. (2019) a car sharing system is a level 2 PSS; MaaS is a result orientated or "level 3" PSS (Ibid.) obtained by linking several PSS, as it delivers the result of mobility. This combination of PSS is indeed consistent with Hensher et al. (2020)'s holistic conception of MaaS (Section 1) and underscores MaaS' sustainability potential (Liimatainen and Mladenovic 2018). Following Enoch et al. (2019), this research utilizes the analytical approach we drew on for our research in PSS to draw insights relevant to MaaS consumption.

3 Conceptual Framework

Research focused on the consumption of car sharing offerings, which can be a potential part of a MaaS bundle, has drawn on behavioural perspectives to study consumer choices (cf. Sopjani et al. 2019, Durand et al. 2018). These perspectives include amongst others the study of individual attitudes to MaaS (cf. Kamargianni et al. 2018). However, a focus on choice is questionable because some aspects of consumption are out of consumers' control (Shove and Warde 2002).

Turning the attention to PSS and sustainable consumption (Catulli 2019), Shwom and Lorenzen (2012) review sustainable consumption concepts and delineate two productive approaches to research it. The first perspective, Consumer Culture Theory, emphasizes emotional behaviour and feelings in a social context, with an emphasis on social agency. The second perspective, Practice Theory, maintains that consumers are "locked-in" to socio-material structures and have limited degrees of freedom (Shwom and Lorenzen 2012), i.e. emphasises social structure. In this paper, we therefore adopt two complementary but distinct approaches and explore their usefulness.

3.1 Who you are – Consumer Culture Theory

The first approach offers insights on the dialogical dynamics of individuality - consumer identity projects - and society. This offers depth and detail to shed insights on how consumers make consumption decisions to gel with social groups and construct their identities through consuming services (Scott et al. 2017), which the traditional perspectives mentioned earlier struggle to do.

Founded in anthropological research (cf. Douglas and Isherwood 1996, Miller 2010), *Consumer Culture Theory* (CCT) is a multidisciplinary approach which focuses on *"the dynamic relationships between consumer actions, the marketplace and cultural meanings*" (Arnould and Thompson, 2005,868) and studies symbolic and experiential aspects of acquisition, consumption and disposal of products and services (Joy and Li 2012). Despite the influence of sociological insights, CCT focuses on individuals' rational, emotional and rationalized decisions and behaviour.

Through consumption and possessions, individuals (and groups) establish their position in societies (Veblen 1899, Douglas and Isherwood 1996) and construct (express) their identities (Belk 1988, Belk and Sherry 2007). CCT focuses therefore on who consumers are. An important vehicle for meanings that help consumers construct identities is a brand, defined as a *"distinguishing name and/or symbol" (such as logo,*

trademark, or pack design) intended to identify the products and services of either one seller or a group of sellers, and to differentiate those products or services from those of competitors" (Aaker 1991, 7). A useful notion associated with brands is *co-branding*, *"the combination of two brands to create a single, unique product."* (Grossman 1997, 36). Co-branding can associate offerings with good causes such as sustainability (Till and Nowak 2000) or even places and create feelings of affiliation to a community of consumers (Dinnie 2004, Hankinson 2010).

Bardhi and Eckhardt (2012) drew on CCT to research car sharing. As already noted in the discussion about MaaS, consumers may favour private cars as these offer reliability and control – they can be used on demand – and embody meanings of status and material success (Richins 1994a) that can be important to the identity of consumers. Other meanings however may help construct consumers' identities, including environmental concerns and altruism (Moisander and Pesonen 2002). Depending on their individual (or group) identities, consumers might deliberately embrace sustainable or materialistic consumption. CCT therefore ascribes *agency* to consumers. Failure to consume in a sustainable manner may be justified by consumers using rational or rationalized justifications (Catulli, 2019). Shove and Warde (2002) however comment that many objects of consumption, such as utilities, are out of the view of consumers, who therefore cannot consume them deliberately. It appears therefore that some options for consumption are beyond individual consumers' choice.

3.2 What you do –Practice Theory

In contrast with CCT, which focuses on consumer choice, Practice Theory (PT) is a sociological theory rooted in the works of Giddens (1984) and Bourdieu (1977). PT focuses on how the social-structural landscape establishes and shapes consumer practices (Warde 2005, 2015). A practice is a

"*routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily and mental activities, "things" and their use, a background knowledge in the form of understanding, know how, states of emotions and emotional knowledge*" (Reckwitz 2002, 249).

Shove et al. (2012) conceptualize these elements as *materials, meanings* and *competences*. Rather than being about who consumers are and seek (as in CCT), Practices are what consumers do (Warde 2005). Social practices are routine performances of activities, which have characteristics of recurrence, collectivity and socio-materiality (Reckwitz 2002).Examples are routines such as food preparation, cleaning clothes and mobility (Halkier and Jensen 2011, Mylan 2015). A practice exists as an entity, which has enduring existence when recurrently performed (Watson 2012). Whilst practitioners perform practices, they appropriate materials and appreciate practices and materials. *Appropriation* is a process, which occurs as human subjects use products in their practices and involves wear and tear of products (Warde 2005). *Appreciation* is the process of attributing meanings to materials and practices (Ibid).

Human subjects are bound to perform their daily practices by social conventions, "*a degree of consensus which implies processes of effective uniform transmission of understandings, procedures and engagements*" (Warde, 2005,136). In addition, human subjects have limited options in their behaviour because of the socio-technical landscape, the exogenous environment including aspects of society such as material and spatial arrangement of cities, transport and energy infrastructure (Watson 2012). Socio-technical innovations can stimulate the evolution of practices. These evolved practices, when not established are termed in PT as proto-practices (Shove et al. 2012). When established, new practices may diffuse following the migration of elements (Ibid.), for example, materials and competences of communication by smartphone become essential

MaaS elements to achieve a positive consumer experience (Hensher et al. 2020).

Proto-practices however encounter resistance to becoming established by the existing socio-technical landscape. For example, private mobility is entrenched because of the relative location of a person's place of work, shopping centres, friends and relatives they visit and the lack of availability of public transport between these locations (Watson 2012). The entrenchment of practices depends on their inherent dynamics, the strength of the linkages between elements within practices and of linkages between practices (Mylan 2015). Indeed, mobility is shaped by linkages with other practices humans perform (Nyblom 2014). From this perspective, as explained earlier, consumers are locked-in socio-material structures (Shwom and Lorenzen 2012) that limit consumers' options to adopt sustainable PSS offerings such as an e-carclub.

CCT and PT offer useful complementary insights to understand MaaS consumption. Respecting their diversity and incommensurability (cf. Shove 2011), CCT and PT were used in parallel (cf. Hammersley 2008) in the research reported in this paper.

4 Methods

The study adopted a case study strategy, which enables research in specific contexts (Yin 1994) as required by CCT and PT (Arnould and Thompson 2007, Shove et al. 2012). Case studies afford credibility and flexibility to operationalize multiple perspectives (Yin 1994). They offer advantages in exploring qualitative aspects, individual actors, historical and social contexts, practices and path dependencies (George and Bennett 2005). The case study described in this paper is the *e-carclub*, an electric car sharing system funded by the *National Energy Foundation* and *Sustainable Venture* (e-carclub.co.uk 2015). Initially e-carclub was an independent organisation but in 2015, the Europcar group acquired a majority share (Ibid.). E-carclub is divided into branches co-managed

with local organizations and each branch is individually co-branded (e.g. *Future Wolverton* (FW), *University of Hertfordshire* (UH) and *Watford City Hall* (WCH) e-carclubs). Each of these branches of e-carclub targets users around these communities. Future Wolverton is a not-for-profit organization (Futurewolverton.org 2015) based in Wolverton, a town of about 19,000 people within Milton Keynes (Visionofbritain.org). UH is a university based in Hatfield, some 30 km. north of London, with a community of over 24,600 students and 2,700 staff (Herts.ac.uk 2017). WCH is the local authority of Watford, a town in Hertfordshire with about 90,000 inhabitants (Watford-City-Hall 2016). As with all car-sharing systems, people subscribe to use e-carclub vehicles. There is an annual £50 fee, in addition to hourly rental fees of between £4.50 for small hatchbacks (Renault Zoe), large hatchbacks (Nissan Leaf) and £7.50 for a light commercial vehicle (Renault Kangoo Max) (e-carclub.co.uk 2015). Membership includes free car charging (Ibid.), insurance, breakdown cover and an instructional video (Ibid.). These vehicles are located on dedicated spaces where drivers can recharge them (Ibid.). Cars are booked via a smartphone with a proprietary app – being accessible by the hour at any time (Ibid). One important aspect of this case study is that e-carclub is designed as a round trip car sharing system, where users have to return the EV to where they picked it up (Le Vine et al. 2014). This has implications for the findings related to MaaS as explained in section 2.

Consistent with case study strategy, multiple methods were used to collect and analyse data from several sources (Robson 2011). In this case, secondary data were collected from market reports. Qualitative data were collected to gain rich insights on car club consumption through 19 semi-structured interviews supported by interview guides informed by CCT and PT and three participant observations in accompanied drives between January and June 2016. Participants were selected from three sites: five were professionals from Wolverton; 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. Participants were interviewed in their offices and in quiet cafés. The interviews were audio recorded and transcribed. Data were analysed using NVivo, a qualitative analysis software, using two separate flexible templates (cf. Miles and Hubermann) based on CCT and PT.

5 Results

5.1 The Consumer Culture Theory perspective

This section reports a consumers' agency narrative of PSS consumption. CCT-based data analysis focuses on individual consumers and groups of consumers, their decisions and behaviour.

5.1.1 Value delivered by the PSS

Consumers seek value in the choices they make. PSS literature focuses on the functional value that a PSS provides (Bertoni et al. 2011, Geum and Park 2011). Participants in the research saw e-carclub as providing such functional value. They could use the EV for shopping or weekend journeys or to load DIY equipment to do jobs in their house, using special vehicles such as the Renault Kangoo. A particular benefit of the PSS was therefore the availability of vehicles suitable for special purposes, which suggested a utilitarian relationship with the PSS offering. However, the PSS had functional disadvantages. The e-carclub used a round-trip model and the structure of the charges for use made this expensive for any purposes when the car was left parked for a long time. Participants said that the need to return the EV to the original station meant that they would have to pay a day's fee for twenty minutes' use. For a number of key uses therefore, the PSS seemed unable to deliver the functional value required. It was most suited to o*ccasional* and *temporary* use and to replacing cars that are infrequently used, particularly in places where parking was limited. In Wolverton, parking was particularly difficult (terraced houses with limited on road parking), which made the PSS a

potential replacement for a second car. However, data indicated that some e-carclub users fell outside of those needing only occasional use and more regular car users wanted more flexibility and functionality than was being offered.

As well as functional value, participants also required symbolic value. This is something little considered in PSS literature. The symbolic value participants to the research drew from e-carclub was associated with environmental and altruistic ideologies. A participant explained that he had been a member of the Green Party - called the "Ecology Party" at that time – and although he lapsed, he had retained interest in politics and environmental issues. Another participant reported his decision to enrol in e-carclub because of ideological thinking which encouraged him to support the initiative. His reasons to join were partly environmental, as the club had electric vehicles and partly functional, to do with the limited parking available near where he lived. He said he thought that expensive assets, such as cars, should be functional and shared, rather than status symbols used occasionally.

Therefore, the PSS offering delivered important symbolic value to the participants who chose to consume it. These ideas of environmental protection made consumers more receptive to sustainable offerings. In contrast, there were key aspects of mobility that led to negative symbolic associations with this PSS. Most participants wanted to show themselves as willing and able to fulfil familial responsibilities such as driving relatives to places in emergencies. In this case, the PSS did not deliver symbolic/hedonic value. Participants therefore valued car ownership. Consumers use value to construct their identities through consumption (Belk 1988) and the next section articulates this further.

5.1.2 Constructing identities through PSS consumption

CCT analysis shows how the symbolic value delivered by e-carclub helped some individual participants define themselves. Some participants stated they were regular users, some had tried e-carclub but lapsed and some

had declined offers to try it. Participants identified with the vehicles they drove in different ways. For example, some regarded themselves as altruistic and committed to relationships because they drove children to clubs and aged parents to medical appointments. Some participants were "proud to be different". They saw themselves as "smart" as they had freed themselves of responsibilities of owning a vehicle, (e.g. paying insurance, maintenance and road tax and finding spaces to park their vehicle). They tended to be younger, (two being students at UH), were single individuals who saw themselves as altruistic and were interested in environmental protection. These ideologies helped them construct their identities. They associated e-carclub with novelty and seemed more inclined to take it up.

One participant, for example, explained that he liked the PSS to be a part of his image of someone who tried to travel by bicycle and share cars rather than driving a private car. He said that this showed him as someone who did something different and interesting. This helped participants identify with e-carclub, which they thought would show them as "trendy". Indeed, a small number of participants identified themselves with e-carclub and saw themselves as altruistic and environmentally conscious. One participant did not own a car and ordinarily travelled by bicycle. There were occasions however when the use of a car was necessary, such as when he needed to drive his visiting parents around or he pursued DIY projects. E-carclub could enable users who did not own a car to help people in need. Another participant reported that the e-carclub PSS made him look altruistic as he drove a friend who had an eye operation to a destination in an e-carclub EV. Here the user saw the PSS as enabling altruistic behaviour. It enabled him to construct his caring, helpful, trendy identity and he saw himself as "hip".

These participants however were a minority. For the majority of the participants, those having families for example, *their own vehicle* supported their identity construction. Most participants saw themselves as

independent and free through car ownership. These participants struggled to identify with vehicles they accessed through the PSS because they wanted to be seen as being able to take people places, even at little notice. This was difficult with e-carclub, as it required pre-booking. Participants claimed that they would pay a premium to have a car ready outside their door. The freedom to access their vehicle at will was a defining aspect of how people constructed their identities, especially when they had families. For most participants, the inability to rely on a car being available at will was an obstacle to taking up the e-carclub PSS.

Furthermore, participants' wish to customise vehicles deterred a number of them from using the PSS offering. A participant who was proud owner of a Volkswagen Transporter commented that because she wanted to be able to customize her vehicle, she was sceptical of e-carclub. Customization of their products was to express their identity (cf. Mugge et al. 2009) through which they say they are part of a community of people who do the same. This participant identified with people who owned a van like hers. The customization process itself creates a bonding with products (Ibid.), so participants wanted to own their vehicles. Therefore, they said that e-carclub was "not me". Ownership itself was important to construct identities (cf. Weiss and Johar 2013). Drivers wanted to be able to personalize their products and ultimately preferred to drive their own cars.

For all users, traces of other e-carclub drivers affected the identification with e-carclub cars (cf. Bardhi and Eckhardt 2012). Users of e-carclub did not want to see traces of previous drivers. Participants did not want the club to have a social dimension and even disliked finding the radio tuned to a station different from their favourite. A further issue was that consumers did not trust the e-car club and other drivers. Participants were concerned about working condition of the vehicle and risks of 'contagion' from previous drivers, for example they were concerned that previous users may have eaten takeaway food in EVs or transported

dangerous substances and that they might find the EV not charged or damaged. This suggests that whilst identity construction, "who I am", is an important aspect of consumption, participants were concerned about the functional risks of consuming the PSS. Service reliability was a key concern consumers had on PSS. For example, participants reported cases when they had to go somewhere quickly and the car was not available when they needed it. Lack of accessibility at the right time is therefore an issue with consumers. Co-branding may reassure consumers on these issues and this is explored next.

5.1.3 The role of co-branding

Brands reassure consumers of products' or services' quality (Sheth et al. 1991). E-carclub adopted a co-branding strategy, built on the e-carclub brand, the brand of car and the brand name of the local provision partner. The research results indicate that two brands exercised influence on the participants, the e-carclub brand and the brand of the local organization associated with provision of the service. These local organizations were Future Wolverton, University of Hertfordshire and Watford City Hall. Participants said that the endorsement of the Wolverton's local authority encouraged them to try the PSS. This suggests that the local character of the PSS offering, associated with the e-carclub brand had an important role in engendering trust. The association with Wolverton was also important for participants' identity. They saw the community as "dynamic" and stated that they belonged to and identified with the brand community. Another participant explained that Wolverton has a very cohesive community with people engaged with and caring about local initiatives.

Compared to UH and WCH, the Wolverton group seemed to be the most committed, perhaps because they felt a sense of belonging to a closer-knit community. This evidenced the importance of the local community character of the PSS for participants' sense of identity. Indeed, participants seemed to favour the local community brand over the

"corporate" e-carclub and the even more corporate Europcar brand. The significance of car sharing itself, embodied in the e-carclub brand, seems to have been ambiguous. Participants noted that e-carclub had become part of Europcar and so they perceived the "club" name as a marketing concept and the system as a "ruse" used to collect data and information about them, which they distrusted. Some participants saw the use of the term "club" for the PSS as a quasi-cynical marketing ploy and did not feel affiliated to e-carclub as a "social club". In contrast, branded smartphone apps, such as e-carclub's proprietary one, seemed to lend credibility and help legitimize and build trust in e-carclub.

As e-carclub detached itself from FW and showed less commitment to its community initiatives, following acquisition by Europcar, members started to lapse, participants said they saw Europcar as anonymous and corporate. Lapsed members claimed that they felt that e-carclub had stopped engaging with Wolverton's local issues.

In summary, the local brand engendered a sense of affiliation, which contributed to the participants' deliberate subscription and consumption of the PSS. The symbolic value sought by some participants helped them to express *who they were*. However, even for people in this category, many lapsed and stopped using the e-carclub. The increased commercialization of e-carclub and association with Europcar seemed to reduce its credibility as a community brand.

5.2 The Practice Theory perspective

An alternative narrative of the same data comes from using an analysis based on Practice Theory. Human subjects with their owned, rented or leased vehicles can perform mobility. In the e-carclub case, participants performed *self-directed mobility using an electric vehicle (EV) use orientated PSS,* a proto-practice. The elements integrated in this focal practice are described through Mylan' (2015) framework of Practice Dynamics, Linkages between Elements and Linkages to other practices.

5.2.1 Dynamics of practice

Mobility in current everyday life in most western countries is shaped by the current socio-technical landscape (Watson 2012), which has developed in response to growth in private car use (Norton 2008) and has features that impact upon the introduction of EV PSS. Humans move in space between disperse places of work, shopping and recreation and this creates stability for incumbent mobility practices which are performed using private vehicles (Watson 2012). Car ownership therefore is considerably entrenched (Pojani and Stead 2015) and it is difficult to introduce alternative transport service systems, such as would be provided by MaaS.

There are, however, dynamics in mobility practices that can favour services like MaaS. These dynamics include increased fuel prices and changes to the socio-technical landscape in the UK. In major Western cities, there is a trend to manage and restrict circulation of traditionally powered vehicles (Ibid.) because of pollution (Lane and Potter 2006), congestion or parking difficulties. There has also been a growth in EV charging stations (Vaughan 2017), facilitated by local authorities and, increasingly, by private companies, (https://www.zap-map.com/live/).

Smartphone apps able to integrate MaaS offerings are becoming more established (Lyons et al. 2019). Negative meanings of environmental damage inflicted by private cars are increasingly being disseminated (Air-quality.org.uk , VCA). These negative meanings, which oppose established mobility practices performed with private cars, may interact with favourable meanings of environmental protection for car sharing in the media, as car sharing is thought to reduce the number of miles driven (Le Vine et al. 2009). These communications also disseminate competences to use car-sharing systems (Vaughan 2017).
For mobility, it has become increasingly common for drivers to use smartphones as route planners. Therefore, elements that underpin

communication practices, such as apps, have migrated into present mobility practices.

Locally, *e-carclub* codified and circulated meanings and competences through their own information leaflets and videos accessible through youtube.com[2]. The local partners facilitated circulation of materials as they allocated parking spaces to EVs (Futurewolverton.org 2015, Watford-City-Hall 2016). Both provider and distribution collaborators, such as UH, promoted the use of smartphones and apps to book EVs (Catulli, 2019). Many users of the e-carclub would be familiar with using apps for mobility, so using the e-carclub app to support tasks such as booking EVs, journey planning and recharging would become part of an existing mobility practice.

The strategy of e-carclub in collaborating with local authorities, community associations and universities had a key role in the circulation of elements. Data suggest that existing members in Wolverton had shared the meanings of *cost-effectiveness, environmental protection* and *social responsibility* of the PSS offering.

From the users' point of view, the practice of mobility through car sharing has been introduced to the UK from other countries. For example, one e-carclub user is American and when she came to the UK following her marriage she noticed and considered e-carclub because it is similar to the car sharing system Zip Car she utilized in the USA. Another participant learnt about car sharing from a relative living in Denmark. This might have supported diffusion of the practice elements in the e-carclub context, as these practices were diffused through human subjects that were already prepared to receive them.

Practitioners were encouraged to try EVs in communications by local partners such as UH and the practice further diffused by social contagion:

[2] for example youtube.com/watch?v=eMdw-qts8Zk

most users reported that they were introduced to e-carclub by a colleague or friend or as part of a launch linked to a social function. In a few cases, an existing member had provided a lift to a person who then became a member.

As seen earlier, the mobility proto-practice was first established as a community initiative and its performance by human subjects was encouraged by a sense of belonging to that community. As a result, they subscribed as members of e-carclub. However, there were participants who tried and subscribed but then lapsed. As in Schatzki's (1996) terms, the proto-practice failed to keep being recurrently performed and reproduce, did not become collective, failed to make linkages with other practices and integrate within the socio-technical landscape, therefore failing to become an established practice. This was partially due to a functional aspect, as e-carclub was a round-trip model and not suited for commuting. As previously noted, participants perceived this as a shortcoming and therefore saw e-carclub as unsuitable for their travel needs. It failed to provide what people wanted to do.

5.2.2 Linkages between practice elements

Materials to perform mobility included the electric vehicles (EV) themselves, ID cards to access and recharge EVs and charging cables, smartphones and apps to book driving slots. EVs had considerable on-board electronics for navigation to charging locations. Infrastructure included charging stations network and parking spaces.

Participants appropriated EVs by driving and used them for a variety of practices where they needed a vehicle for transport. In most situations, mobility was not of value in itself but was a practice coupled with practices the performance of which required travelling.

Competences - materials were linked to specific new competences (cf. Shove et al. 2012) which were necessary to perform mobility through the EV PSS offering. New competences included driving EVs, locating and

using charging stations, as drivers were responsible for leaving EVs on charge for next users (e-carclub.co.uk 2015). For longer trips, planning stops at charging stations was a further competence needed. New driving techniques were required; the novelty made some participants unconfident and they needed support to learn new practices. Participants were concerned about penalties for returning EVs dirty, damaged or later than the booked time, for example when invited by friends to impromptu social events.

Participants were not all *equally* confident of having the required competences to perform mobility through the PSS or access practices. In particular, they were concerned about possible penalties for damages occurred to an EV due to their lack of driving experience.

E-carclub members used existing competences with materials such as smartphone apps to book EVs and navigation. Thus, elements of communication practices integrated with those of mobility to support tasks such as booking EVs and journey planning. Participants even said that the ability to book EVs through a mobile phone app gave them confidence in using the system. Therefore, apps had a role in legitimising the PSS.

Drivers needed to perform access practices and learnt associate competences to perform mobility provided through the PSS. Learning access practices challenged some participants, for example remembering passwords and login names. E-carclub mobility also involved travelling by public transport and walking to where EVs were parked, which participants were reluctant to perform.

Here access to club cars was problematic and participants preferred having their own car parked outside their home because of the practical inconvenience to carry materials to the EV. The use of smartphone apps to book and access the EVs, however, seemed to give *younger*

participants a sense of *control* and *ease of access*, which perhaps helped associate these meanings with the PSS offering. Younger participants – students for example, were more likely to associate these meanings of access practices to apps, with which they were familiar.

Meanings – Mobility practices performed with practitioners' own vehicles were appreciated with meanings of *Capability* to fulfil *familial responsibilities*, such as taking children to school and aged parents to medical appointments, even in an emergency. Capability is a person's ability to achieve various valuable functionings as a part of living (Nussbaum 2011). Participants considered cars materials supporting capability to fulfil these responsibilities. For example, a participant explained that a relative's family planned to buy a car for her niece so that she could shoulder some responsibility for driving the other kids around to various destinations.

Participants with families explained that using owned vehicles was more flexible than using the e-carclub, enabling them to meet these *familial responsibilities*. They said that the e-carclub would not give them enough flexibility to drive where and when needed to fulfil those responsibilities. Therefore, the proto-practice was *not* appreciated with capability. Younger, single people and students have different mobility practices, for example, they may not own a car but occasionally need one and so their view of the PSS was more positive. For example, they could book an EV from e-carclub to drive relatives occasionally around when public transport was not available. For young, single people and students, therefore, unlike in the case of people with families, e-carclub could be appreciated with meanings of capability and affordability. The practices that they performed did not need the instant access to the PSS that private car users expected.

Participants appreciated mobility performed with private cars with *altruism* because it enabled them to help other people travel. However, participants also appreciated private cars with negative meanings because

these are sources of pollution. In contrast, mobility performed using e-carclub was appreciated with *environmental protection* because the vehicles were electric and sharing would reduce vehicles on the road. However, this meaning motivated users with families *less* than the capability associated with driving their own car to fulfil perceived familial responsibilities. In contrast, younger single participants without children appreciated the proto-practice with altruism, because by performing it they could assist people, which they would not have been able to otherwise, as in some cases they did not own a car. This was another example of the coupling between practices' elements leading to contrasting responses from different participants.

Participants appreciated the proto-practice with *freedom* from responsibilities, such as parking, maintenance and taxes but also with concerns about penalties for damages to the EV. Freedom was thus limited by this contractual liability towards e-carclub. As a participant explained, in his own car he could load items such as wetsuits and occasionally a boat on the roof. He used his own car as a workhorse and he said he felt that mistreating his own car is fine but damaging an EV accessed through PSS could incur penalties. From this perspective, PSS limits freedom to use.

Whilst mobility using an owned car was appreciated with *independence*, this was less so for mobility performed through PSS. Some participants associated the offering with meanings of *cost-effectiveness*. There were some other notable positive meanings: participants associated mobility through PSS with *novelty* and *modernity* – because of the EV itself and because of the practice of booking the service through smartphone. However, some participants stated that they associated the fully automated system accessed through a user name and password with possible lack of assistance if faults occurred. Traditional driving was more appreciated with meanings of *safety* than the PSS offering. On the other hand, other participants appreciated the proto- practice with meanings of

health because car ownership tempted people to use cars every day, therefore discouraging users from walking around for fitness and only use an EV when they really needed it.

Overall, appreciation of mobility with familial responsibilities and the perceived better reliability of private cars to fulfil these produced a "lock in" effect of traditional mobility practices, which were therefore entrenched with most practitioners. However, for those who were confident with smartphone apps, the practice had more chance to become institutionalized and this might have been linked to age, income and level of education.

5.2.3 Linkages to other practices

Mobility is linked to other practices such as working, shopping and leisure activities (Nyblom 2014). These practices can include those performed by friends and relatives, for example attendance of school and sports, leisure activities and medical treatments. Such practices can create familial responsibilities for users as noted in 5.2.2. For example, a participant explained, her sister had to take her children to social activities, participating in choirs and sports. Her daughter could take on some of that responsibility if she had her own car. Mobility through a PSS often fails to match well with such responsibilities. For some other practices there is a better match, for example DIY practices as these are performed infrequently, are planned and are short term. An example was the use of the e-carclub Renault Kangoo to perform the proto-practice for DIY by a participant when he needed to buy bulky items for repairs to his house. He therefore used an e-carclub vehicle when he had to get big rolls of insulation foam and other bulky items. As he did not own a car, the PSS offering enabled this participant to transport materials to perform DIY practices. However, as seen in 5.1.1, participants stated that e-carclub was not convenient for most work-related travel as drivers needed to pay rental charges even when the car was parked, which would not have occurred with their own vehicles. These service design factors and

limitation to round trips made access to materials too costly for practitioners.

Although, as mentioned in section 4, e-carclub was designed as a round trip model and was not configured for commuting, data suggest that some participants saw the PSS as a means to travel for professional reasons. Therefore, a major source of entrenchment of traditional mobility was its link with the practice of commuting and other work-related travel. In comparison, the proto-practice struggled to link with these practices. The need to carry heavy equipment needed for work to the e-carclub vehicle (which might be parked far from home) was a problem and made participants averse to the proto-practice. For one participant, driving her car was linked to her work as a home teacher to children unable to attend normal schools. The proto-practice therefore is challenged by need to transport heavy loads to work. For her, the problem was the hassle of getting to the site where the EV was parked. Travelling there by bus would take an hour and would not take her exactly to the parking spot, which would be a problem if she carried heavy items. The current sociotechnical landscape means that people might have to travel far to work and hence would need a car and the charging infrastructure and distribution network of e-carclub EVs are insufficient. Importantly, this need to switch between transport modes, which is typical of MaaS, seemed ill accepted by participants.

In short, linkages of automobility with a number of other mundane practices performed by human subjects have the potential to shape the consumption of the PSS mobility offering. Some of the daily practices they performed, such as travelling to work and driving other people to places made mobility through private cars entrenched. E-carclub would therefore be at best a secondary, backup means of mobility. On the other hand, linkages to practices such as DIY were easily established by mobility through accessed EVs. However, the provision of a van by e-carclub was at only one site and vans rarely feature in car sharing.

Discretionary travel such as planned weekend travel for leisure may have encouraged PSS mobility. However, linkages with activities which were more difficult to predict and plan, such as taking children to sports events or parties and parents to hospitals make traditional mobility entrenched. The exploration of the dynamics of mobility practices through the e-carclub PSS revealed difficulties in integration of practice elements and linkages of mobility with everyday practices. This suggests that even if "who they are" might encourage PSS consumption, what consumers do, the practices they perform, might prevent consumers from consuming a PSS such as a car sharing or even a more comprehensive MaaS offering.

6 Discussion

Mobility as a Service (MaaS) relies on the integration of a number of travel options through apps to configure a result orientated PSS. Starting from the premise that PSS and MaaS consumption entail similar processes (Enoch et al. 2019), we studied PSS consumption to help explore the nexus between the identity construction consumers pursue and their performance of practices in the socio-technical landscape. We then discussed the relevance of this nexus to MaaS consumption. We draw on two approaches from the sociology of consumption, namely CCT and PT, to provide useful complementary insights for policy to promote MaaS (cf. Li and Voege 2017).

6.1 PSS consumption

CCT based analysis of the PSS case study offers insight in the role of individual consumer choice and deliberate behaviour in PSS consumption. Results confirm that in some cases, participants simply chose not to consider e-carclub, with reasons varying from affinity with materialism, wish to be seen as independent and free through car ownership (cf. Choo and Mokhtarian 2004) and to have control over their vehicles (cf. Tukker 2015), so to use them as they pleased (cf. Snare 1972). Car ownership seems to shape these participants' identities (cf. Karanika and Hogg 2012, Choo and Mokhtarian 2004). Consumers therefore choose to use

their own vehicles to draw positive symbolic value from products they own (Richins 1994b). Ownership also helps users identify with other users of the same type of vehicle and delivers a sense of belonging (cf. Schouten and McAlexander 1995, Cova and Cova 2002, Schulz 2006). In contrast, Users of e-carclub did not want to see traces of previous drivers (cf. Bardhi and Eckhardt 2012).

Belk (2014) however, claims that consumers can also identify with accessed products, so that a PSS could offer symbolic value to construct identities. This contradicts Bardhi and Eckhardt's (2012) claim that drivers do not identify with accessed vehicles. CCT theorizes that ideology shapes consumption (cf. Kozinets and Handelman 2004, Moisander and Pesonen 2002). This may have made the PSS offering attractive to certain types of people. Indeed, participants who expressed concern about environmental protection seemed to identify with the EV car sharing system.

One key result was that users are not well disposed towards a brand of car sharing (cf. Bardhi and Eckhardt 2012) and use of the term 'club' was problematic. The co-branding of the PSS however was associated with the values of a community (Hankinson 2012). E-carclub was therefore compatible with who the consumers were. The E-carclub branded app seemed to give participants confidence in the PSS.

From this, one could expect that these consumers would choose to consume the EV PSS. Yet despite initially enrolling in e-carclub, many lapsed as members and ceased PSS consumption. Rational or rationalized justifications included:

- Contagion – participants did not want to see traces of previous users (cf. Bardhi and Eckhardt 2012);
- Lack of availability of vehicles at the right time and service reliability of PSS (cf. Catulli 2012, Firnkorn and Müller 2012);
- Low trust in ICT systems and in membership enrolment in the PSS offering;

- Costs of keeping the vehicle parked at work;
- Suitability of e-carclub predominantly for occasional and temporary use, which affects users' perceived value (cf. Armstrong et al. 2015).
- Animosity towards transition of e-carclub from local to corporate following purchase by Europcar.

PT based analysis offers alternate insights in the lapse in e-carclub membership. PT does not reject deliberate behaviour (Catulli, 2019) but pays little attention to mental processes of individuals (Swidler 2001, Shove et al. 2012). However, what PT does provide is that individual differences can be considered compatible with some practices and not with others. If users have not adjusted their lifestyle to practices made possible by easy availability of owned cars (e.g. if they just gained their driving licence and their first driving experience is e-carclub), then the EV PSS does provide a better match.

Users associated vehicles owned outright with meanings in traditional mobility practices. Thus, participants appreciated mobility practices through private vehicles with capability (cf. Sen 1993) to assist relatives, as participants could rely on their own vehicle to meet responsibilities towards family and others, reliability and, even more importantly, flexibility, as drivers could simply appropriate vehicles at will.

PT analysis also offered the insight that performing mobility practices using PSS requires competences to access vehicles. In PSS consumption, from a PT perspective, access becomes a routine, mundane practice (Catulli, 2019), which practitioners need to learn to perform. This significantly changes mobility, as it involves planning and ICT skills. These cognitive demands affect PSS diffusion. The research findings here point to greater ability of younger users to manage a PSS through apps compared to older users. Some e-carclub participants therefore were better at developing the competences associated with access than others.

A strategy of implementation in association with a local community facilitates PSS uptake. Community organizations supported circulation of meanings, competences and materials. For example, reserved parking spaces were allocated to EVs and equipped with charging points. Members of these communities were encouraged to perform the proto-practice. Feelings of belonging to these communities was a key element that encouraged trial of PSS. A crucial outcome, indeed, was that members dropped their membership of e-carclub when the company distanced itself from the community to become a more commercial operation.

Results highlighted concern with the inflexibility of the PSS offering. In line with Mylan (2015), traditional mobility practices were coupled with other practices such as work, shopping and social trips. Indeed, employment shapes many aspects of consumption including mobility (Sanne 2002, Jackson and Papathanasopoulou 2008). E-carclub was designed for planned occasional short duration car trips. Yet participants, although it was ill suited to replace private cars, expected E-carclub to support their commuting to work. However, whilst some types of consumers are willing to choose PSS offerings, as they are associated with meanings of environmental protection, use of a PSS contrasts with the socio-technical landscape (cf. Watson 2012) and responsibilities that these consumers had to go to work and support their dependants.

In summary, some types of consumer identities were compatible with the EV PSS and yet e-carclub had growth issues. Even participants who tried e-carclub ultimately dropped their membership. The CCT-informed account indicates that consumers may deliberately lapse from PSS consumption, motivated by migration of e-carclub from a community to a commercial brand.

6.2 Implications for MaaS implementation

The establishment of mobility practices using PSS has implications for MaaS implementation (cf. Lyons et al. 2019), because car sharing plays an important role in MaaS offerings (Eckhardt et al. 2018). The

entrenched nature of mobility through private cars presents considerable challenges to mobility through car sharing. Of course, MaaS could offer greater flexibility through a wider range of options than e-carclub and ideally, guarantee consumer mobility through backup options (Hensher et al 2020). However, poor performance of the car-sharing component has the potential to undermine consumers' positive experience. The unplanned nature of most journeys challenges models of MaaS consumption, built on the assumption that consumers make travel decisions in conditions of certainty (Jittrapirom et al. 2017). The provision of backup solutions might be a challenge for unforeseen travel needs not accommodated by the car club. In these cases, perceived responsibility to drive dependants around would be a challenge for MaaS, confirming Polydoropoulou et al.'s (2018) claims.

Although the research focused on PSS, consumers' reluctance to combine means of transport (such as traveling by bus to the shared car location), has implications for MaaS, as the latter relies on integration of diverse means of transport. The unwillingness to accept this integration, which is a key aspect of MaaS, might therefore hinder MaaS diffusion, which may be aggravated by insufficient scale of operation (Hensher et al. 2020).

The role of the brands of apps in facilitating PSS consumption suggests that such brands may also facilitate or induce the trial of MaaS offerings (cf. Brexendorf et al. 2015, Sinapuelas et al. 2015), at least in younger consumers and students. In contrast, the observed negative impact on PSS consumption of the move away of the provider from community branding has potential to hinder MaaS implementation, because MaaS depends on collaborative operations involving multiple stakeholders, rather than private corporations (Jittrapirom et al. 2017, Polydoropoulou et al. 2018). Another concerning result for MaaS is the low trust of users in ICT systems as subscription and digital interfaces are key aspects of MaaS.

The suggestion that PSS can deliver symbolic value to some types of consumers might mean that MaaS can also deliver this value. Some consumers may be able to construct an altruistic identity by integrating a number of travel modes through apps for their travel. Interestingly, whilst MaaS research suggests that personalization and customization *of service* is important (Jittrapirom et al. 2017), results from this research reveal that consumers value personalization and customization of *vehicles* (cf. Mugge et al. 2009), which require their ownership (Snare 1972) and therefore could be problematic for MaaS diffusion.

The observed difficulty of some types of consumers to access e-carclub EVs confirms the cognitive challenges of MaaS (cf. Lyons et al. 2019) and that MaaS "might not be for everyone" (Hensher et al., 2020, 68). Overall, these findings add more nuance to suggested barriers to MaaS such as poor digitalization in the population, low trust in digital monetary transactions and unwillingness to share data (cf. Polydoropoulou et al. 2018). This suggests that consumers' competences could shape MaaS consumption more than their choice.

In summary, the analysis questions whether consumers actually have the option of consuming e-carclub and this could affect wider MaaS offerings. What consumers do may prevent them from consuming MaaS even if it expresses who they are.

7 Conclusions

The title of this paper posed the question, is it who you are or what you do that shapes sustainable mobility? The research underpinning this paper focused on consumption of an electric car club, a use orientated Product Service System; however, since car sharing is a key option within MaaS offerings, many of the insights have implications for MaaS.

Who consumers are, the identities they wish to construct, will shape their consideration of the car club as a key component of MaaS and the acceptance of the overall proposition. This suggests that MaaS is not for

everyone. Even with education programmes, some consumers, be they older or less digitally literate might not adopt MaaS. In this respect, the findings on brand and brand community in e-carclub may be relevant, as they suggest strategies to target groups of consumers with potential who could adopt MaaS motivated by a sense of belonging to an elective brand community. Smartphone apps might be a vehicle to promote brands. This may be a direction for future research.

What consumers do limits their freedom to consume MaaS. Consumer engagement in interlinked activities and concern for the first and last mile suggest that scale of operation is indeed essential for MaaS to succeed. This can be a daunting challenge because it requires fine grain integration for backup options to be available when a key component such as car sharing does not deliver and this requires investment and integration of offerings from diverse providers. How providers can achieve such integration requires further research.

The two perspectives from PSS literature used to analyse car sharing in this paper demonstrate their utility in guiding providers and policy makers to promote MaaS. Communication strategies, simplification of access practices and consumer education on MaaS benefits could be designed to target the "right" potential users. Collective investment and coordination could aim to ensure a door-to-door service. Finally, this paper encourages MaaS researchers to reach out of their current research boundaries into germane fields such as PSS Consumption and appreciate the associated understandings and literature streams.

Acknowledgements

The Research and Development Management Association (RADMA), UK supported this work

References

Aaker, D. A. 1991. Managing brand equity : capitalizing on the value of a brand name. Free Press ; Maxwell Macmillan Canada.
Air-quality.org.uk. Motor Vehicle Emission Controls: Fuel Types.
Armstrong, C. M., K. Niinimäki, S. Kujala, E. Karell, and C. Lang. 2015. Sustainable product-service systems for clothing: exploring consumer perceptions of consumption alternatives in Finland. Journal of Cleaner Production **97**:30-39.
Arnould, E. J., and C. Thompson. 2007. Consumer Culture Theory (and we really mean Theorethics): dilemmas and opportunities posed by an academic branding strategy. Pages 3–22 *in* R. W. B. a. J. F. S. J. (eds), editor. Research in Consumer Behaviour. Elsevier, Oxford.
Arnould, E. J., and C. J. Thompson. 2005. Consumer Culture Theory (CCT): Twenty Years of Research. Journal of Consumer Research **31**:868-882.
Bardhi, F., and G. M. Eckhardt. 2012. Access-Based Consumption: The Case of Car Sharing. Journal of Consumer Research **39**:1-18.
Belk, R. 1988. Possessions and the Extended Self. Journal of Consumer Research **15**:139-168.
Belk, R. W. 2014. You are what you can access: Sharing and collaborative consumption online. Journal of Business Research **67**:1595–1600.
Belk, R. W., and J. F. Sherry, editors. 2007. Consumer Culture Theory. JAI Press, Elsevier, Oxford.
Bertoni, A., O. Isaksoon, M. Bertoni, and T. Larsson. 2011. Assessing the value of sub-system technologies including Lyfe Cycle alternatives. 18th CIRP International Conference on Lyfe Cycle Engineering, Braunschweigh.
Bourdieu, P. 1977. Outline of a Theory of Practice. Cambridge University Press, Cambridge.
Brexendorf, T. O., B. Bayus, and K. L. Keller. 2015. Understanding the interplay between brand and innovation management: findings and future research directions. Journal of the Academic of Marketing Science **43**:548-557.
Catulli, M. 2012. What Uncertainty? Further Insights on why consumers might be distrustful of product service systems. Journal of Manufacturing Technology Management **23**:780-793.
Catulli, M. 2019. An Investigation into the Social and Cultural Dynamics that Shape Product Service Systems Consumption. The Open University, Milton Keines.
Catulli, M., M. Cook, and S. Potter. 2017. Consuming use orientated product service systems: a Consumer Culture Theory perspective. Journal of Cleaner Production **141**:1186-1193.
Catulli, M., M. Cook, and S. Potter. 2019. Investigating how socio material structures shape Product Service System consumption. Journal of Manufacturing Technology Management **in review**.
Cherubini, S., G. Iasevoli, and L. Michelini. 2015. Product-service systems in the electric car industry: critical success factors in marketing. Journal of Cleaner Production **97**:40-49.
Choo, S., and P. L. Mokhtarian. 2004. What type of vehicle do people drive? The role of attitude and lifestyle in influencing vehicle type choice. Transportation Research Part A **38**:201–222.
Cook, M. B., T. A. Bhamra, and M. Lemon. 2006. The transfer and application of Product Service Systems: from academic to UK manufacturing firms. Journal of Cleaner Production **14**:1455-1465.
Cova, B., and V. Cova. 2002. Tribal Marketing: The tribalization of society and its impact on the conduct of marketing. European Journal of Marketing **36**:595-620.
Dinnie, K. 2004. Place Branding: Overview of an emerging literature. Plce Branding **1**:106–110|
Douglas, M., and B. Isherwood. 1996. The world of goods - towards an anthropology of consumption. Routledge, London.
Durand, A., L. Harms, S. Hoogendoorn-Lanser, and T. Zijlstra. 2018. Mobility-as-a-Service and changes in travel preferences and travel behaviour: a literature review. 978-90-8902-195-3, KiM Netherlands Institute for Transport Policy Analysis, Ministry of Infrastructure and Water Management, The Hague.
e-carclub.co.uk. 2015.
Eckhardt, J., L. Nykänen, A. Aapaoja, and P. Niemi. 2018. MaaS in rural areas - case Finland. Research in Transportation Business & Management **27**:75-83.

Enoch, M., S. Potter, and P. Michalaki. 2019. Possible Futures for a MaaS (Mobility as a Service) Market. Transportation Research Board - Annual Meeting, Washington D.C.
Firnkorn, J., and M. Müller. 2012. Selling Mobility instead of Cars: New Business Strategies of Automakers and the Impact on Private Vehicle Holding. Business Strategy and the Environment **21**:264–280.
Futurewolverton.org. 2015. Future Wolverton - realizing our community vision.
George, A. L., and A. Bennett. 2005. Case Study and Theory Development. Belfer Center for Science and International Affairs, Cambridge, Massachussetts.
Geum, Y., and Y. Park. 2011. Designing the sustainable product-service integration: a product-service blueprint approach. Journal of Cleaner Production **19**:1601-1614.
Ghose, A., and S. P. Han. 2014. Estimating demand for mobile applications in the new economy. Management Science **60**:1470-1488.
Giddens, A. 1984. The Constitution of Society. Polity Press, Cambridge.
Grossman, R. P. 1997. Co-branding in advertising: developing effective associations. Journal of Product and Brand Management **6** 191-201.
Hammersley, M. 2008. Troubles with triangulation. Sage, London.
Hankinson, G. 2010. Place branding research: A cross-disciplinary agenda and the views of practitioners. Place Branding and Public Diplomacy **6**:300-315.
Hensher, D A, Mulley, C, Nelson, J D, Ho, C, Smith, G and Wong, Y (2020) Understanding Mobility as a Service (MaaS). Past, Present and Future. Elsevier.
Herts.ac.uk. 2017. University of Hertfordshire Website.
Ho, Chinh Q, D.A. Hensher, C. Mulley and Y.Z.Wong.2018.Potential uptake and willingness-to-pay for Mobility as a Service (MaaS): A stated choice study. Transportation Research Part A 117:302-318
Illgen, S., and M. Höck. 2018. Electric vehicles in car sharing networks – Challenges and simulation model analysis. Transportation Research Part D: Transport and Environment **63**:377-387.
Jackson, T., and E. Papathanasopoulou. 2008. Luxury or 'lock-in'? An exploration of unsustainable consumption in the UK: 1968 to 2000. Ecological Economics **68**:80-95.
Jittrapirom, P., V. Caiati, A. M. Feneri, S. Ebrahimigharehbaghi, M. J. Alonso Gonzalez, and J. Narayan. 2017. Mobility as a Service: A Critical Review of Definitions, Assessments of Schemes, and Key Challenges. Urban Planning **2**:13.
Joy, A., and E. P. H. Li. 2012. Studying Consumption Behaviour through Multiple Lenses: An Overview of Consumer Culture Theory. Journal of Business Anthropology **1**:141-173.
Kamargianni, M., M. Matyas, W. Li, J. Muscat, and L. Yfantis. 2018. The MaaS Dictionary. Energy Institute, University College London, London.
Karanika, K., and M. K. Hogg. 2012. Trajectories across the lifespan of possession-self relationships. Journal of Business Research.66:7, 910-916
Kim, D., J. Ko, and Y. Park. 2015. Factors affecting electric vehicle sharing program participants' attitudes about car ownership and program participation. Transportation Research Part D: Transport and Environment **36**:96-106.
Kim, J., S. Rasouli, and H. J. P. Timmermans. 2017. The effects of activity-travel context and individual attitudes on car-sharing decisions under travel time uncertainty: A hybrid choice modeling approach. Transportation Research Part D: Transport and Environment **56**:189-202.
Kozinets, R. W., and J. M. Handelman. 2004. Adversaries of Consumption: Consumer Movements, Activism, and Ideology. Journal of Consumer Research **31**:691-704.
Lane, B., and S. Potter. 2006. The adoption of cleaner vehicles in the UK: exploring the consumer attitude-action gap. Journal of Cleaner Production **15**:1085-1092.
Le Vine, S., M. E. H. Lee-Gosselin, and J. W. Polak. 2009. An analysis of car club participation and its environmental effects. UTSG, London.

Le Vine, S., L.-G. Martin, A. Sivakumar, and J. W. Polak. 2014. A new approach to predict the market and impacts of round-trip and point-to-point carsharing systems: Case study of London. Transportation Research Part D **32**:218–229.
Lemme, R. F. F., E. F. Arruda, and L. Bahiense. 2019. Optimization model to assess electric vehicles as an alternative for fleet composition in station-based car sharing systems. Transportation Research Part D: Transport and Environment **67**:173-196.
Leuthesser, L., C. Kohli, and R. Suri. 2003. 2+2=5? A framework for using co-branding to leverage a brand. Brand Management **11**:35-47.
Li, Y., and T. Voege. 2017. Mobility as a Service (MaaS): Challenges of Implementation and Policy Required. Journal of Transportation Technologies **7**:95-106.
Liimatainen, H., and M. N. Mladenovic. 2018. Understanding the complexity of mobility as a service. Research in Transportation Business & Management **27**:1-2.
Lyons, G., P. Hammond, and K. Mackay. 2019. The importance of user perspective in the evolution of MaaS. Transportation Research Part A: Policy and Practice **121**:22-36.
Miller, D. 2010. Stuff. Politi Press, Cambridge.
Moisander, J., and S. Pesonen. 2002. Narratives of sustainable ways of living: constructing the self and the other as a green consumer. Management Decision **40**:329-342.
Mont, O. K. 2002. Clarifying the concept of Product Service System. Journal of Cleaner Production **10**:237-245.
Mugge, R., J. P. L. Schoormans, and N. J. Schifferstein. 2009. Emotional Bonding with personalised products. Journal of Engineering Design **20**:467-476.
Mylan, J. 2015. Understanding the Diffusion of Sustainable Product-Service Systems: Insight from the Sociology of Consumption and Practice Theory. Journal of Cleaner Production **97**:13-20.
Nash, N., L. Whitmarsh, S. Capstick, T. Hargreaves, W. Poortinga, G. Thomas, E. Sautkina, and D. Xenias. 2017. Climate-relevant behavioral spillover and the potential contribution of social practice theory. Wiley Interdisciplinary Reviews: Climate Change **8**:481.
Norton, P. D. 2008. Fighting Traffic: The dawn of the motor age in the American city. The MIT Press, Cambridge, Massacussetts.
Nussbaum, M. 2011. Creating Capabilities: The Human Development Approach. Harvard University Press, Cambridge, Ma.
Nyblom, Å. 2014. Making plans or “just thinking about the trip”? Understanding people’s travel planning in practice. Journal of Transport Geography **35**:30-39.
Patterson, J., M. Alexander, and A. Gurr. 2011. Preparing for a life cycle CO2 measure. London.
Pojani, D., and D. Stead. 2015. Sustainable Urban Transport in the Developing World: Beyond Megacities. Sustainability **7**:7784-7805.
Polydoropoulou, A., I. Pagoni, and A. Tsirimpa. 2018. Ready for Mobility as a Service? Insights from stakeholders and end-users. Travel Behaviour and Society.21:295-306
Potter, S., H. Roby, M. Cook, and P.-A. Langendahl. 2011. Transport and environmental innovation. Sustainable Innovation 11 ’State of the Art in Sustainable Innovation and Design’. The Open University, Farnham, Surrey.
Reckwitz, A. 2002. Toward a Theory of Social Practices. European Journal of Social Theory **5**:243-263.
Richins, M. 1994a. Special Possessions and the Expression of Material Values. Journal of Consumer Research **21**:522-533.
Richins, M. 1994b. Valuing Things: The Public and Private Meanings of Possessions. Journal of Consumer Research **21**:504-521.
Robson, C. 2011. Real World Research. John Wiley & Sons, Chichester.
Sanne, C. 2002. Willing consumers—or locked-in? Policies for a sustainable consumption. Ecological Economics **42**:273-287.
Schatzki, T. R. 1996. Social Practices Cambridge University Press, New York
Schouten, J. W., and J. H. McAlexander. 1995. Subcultures of Consumption: An Ethnography of the New Bikers. Journal of Consumer Research **22**:43-61.

Schulz, J. 2006. Vehicle of the Self. Journal of Consumer Culture **6**:57-86.
Scott, R., J. Cayla, and B. Cova. 2017. Selling Pain to the Saturated Self. Journal of Consumer Research **44**:22-43.
Sen, A. 1993. Capability and Well-Being.*in* M. Nussbaum and A. Sen, editors. The Quality of Life. Oxford University Press, Oxford.
Sheth, J. N., B. I. Newman, and B. L. Gross. 1991. Why we buy what we buy: A theory of consumption values. Journal of Business Research **22**:159-170.
Shove, E. 2010. Beyond the ABC: climate change policy and theories of social change. Environment and Planning **42**:1273 - 1285.
Shove, E. 2011. On the difference between chalk and cheese a response to Whitmarsh et al's comments on ``Beyond the ABC: climate change policy and theories of social change''. Environment and Planning A **43**:262-264.
Shove, E., M. Pantzar, and M. Watson. 2012. The Dynamics of Social Practice: Everyday life and how it changes. SAGE Publications.
Shove, E., and A. Warde. 2002. Inconspicuous Consumption: The Sociology of Consumption, Lifestyles, and the Environment. Pages 230-249 *in* R. E. Dunlap, F. H. Buttel, P. Dickens, and A. Gijswijt, editors. Sociological Theory and the Environment. Roman & Littlefield Publishers, Lanham.
Shwom, R., and J. A. Lorenzen. 2012. Changing household consumption to address climate change: social scientific insights and challenges. Wiley Interdisciplinary Reviews: Climate Change **3**:379-395.
Sierzchula, W., S. Bakker, K. Maat, and B. van Wee. 2012. The competitive environment of electric vehicles: An analysis of prototype and production models. Environmental Innovation and Societal Transitions **2**:49-65.
Sinapuelas, I. C., D. H. M. Wang, and J. Bohlmann. 2015. The interplay of innovation, brand and marketing mix variables in line extensions. Journal of the Academy of Marketing Science **43**:558- 573.
Snare, F. 1972. The Concept of Property. American Philosophical Quarterly **9** 200-206.
Sopjani, L., J. J. Stier, S. Ritzén, M. Hesselgren, and P. Georén. 2018. Involving users and user roles in the transition to sustainable mobility systems: The case of light electric vehicle sharing in Sweden. Transportation Research Part D: Transport and Environment.71:207-221
Sovacool, B. K., J. Axsen, and S. Sorrell. 2018. Promoting novelty, rigor, and style in energy social science: Towards codes of practice for appropriate methods and research design. Energy Research & Social Science **45**:12-42.
Stephenson, J., S. Spector, D. Hopkins, and A. McCarthy. 2018. Deep interventions for a sustainable transport future. Transportation Research Part D: Transport and Environment **61**:356-372.
Surakka, T., F. Härri, T. Haahtela, A. Horila, and T. Michl. 2018. Regulation and governance supporting systemic MaaS innovations. Research in Transportation Business & Management **27**:56-66.
Swidler, A. 2001. What anchors cultural practices. Pages 74-93 *in* T. R. Schatzki, K. Knorr Cetina, and E. von Savigny, editors. The Practice Turn in Contemporary Theory. Routledge - Taylor & Francis, New York.
Till, B. D., and L. I. Nowak. 2000. Toward effective use of cause-related marketing alliances. Journal of Product and Brand Management **9** 472-484.
Tukker, A. 2015. Product services for a resource-efficient and circular economy – a review. Journal of Cleaner Production **97**:76-91.
Vaughan, A. 2017. Electric cars: everything you need to know. The Guardian.
VCA. Vehicle Certification Agency.
Veblen, T. 1899. The Theory of the Leisure Class. A Public domain book.
Visionofbritain.org.
Warde, A. 2005. Consumption and Theories of Practice. Journal of Consumer Culture **5**:131-153.

Warde, A. 2015. The Sociology of Consumption: Its Recent Development. Annual Review of Sociology **41**:117–134.
Watford-City-Hall. 2016. Watford Transport Policy.*in* M. Catulli, editor.
Watson, M. 2012. How theories of practice can inform transition to a decarbonised transport system. Journal of Transport Geography **24**:488-496.
Weiss, L., and G. V. Johar. 2013. Egocentric Categorization and Product Judgment: Seeing Your Traits in What You Own (and Their Opposite in What You Don't). Journal of Consumer Research **40**:185-201.
whimapp.com/ accessed 15/10/2020
White, A. L., M. Stoughton, and L. Feng. 1999. Servicizing: The Quiet Transition to Extended Product Responsibility. U.S. Environmental Protection Agency - Office of Solid Waste.
Whitmarsh, L., S. O'Neill, and I. Lorenzoni. 2011. Climate change or social change? Debate within, amongst, and beyond disciplines. Environment and Planning A **43**:258 -261.
Whittle, C., L. Whitmarsh, P. Hagger, P. Morgan, and G. Parkhurst. 2019. User decision-making in transitions to electrified, autonomous, shared or reduced mobility. Transportation Research Part D: Transport and Environment.71:302-3019
Wong, Y.Z., D.A.Hensher and C. Mulley.2020.Mobility as a Service (MaaS): Charting a future context. Transportation Research Part A, 131:5-19
Yin, R. K. 1994. Case Study Research: Design and Methods. SAGE.