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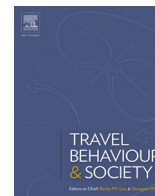
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Drivers and barriers in adopting a crowdshipping service: A mixed-method approach based on an extended theory of planned behaviour

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ABSTRACT

Increasing traffic from last mile delivery related to e-commerce adds to issues of congestion, carbon emissions and liveability in cities worldwide. The present study investigates the potential and accompanying contingencies for user-uptake of a crowdshipping solution that combines automated parcel lockers with public transport, allowing users to bring along parcels on their trips, in an attempt to reduce last mile traffic and associated challenges. We apply a mixed-method approach, using in-depth interviews and an online survey based on an extended version of the Theory of Planned Behaviour, to examine the motivational drivers, barriers and socio-spatial contexts influencing the intention to participate in the proposed crowdshipping concept. To this end, relevant demographic and psychological factors are investigated. Results point to the importance of three psychological factors: (1) the anticipated social value and positive emotions, (2) perceived ease of use and convenience and (3) the potentially sceptical attitudes towards participating in a commercially organized crowdshipping concept including the possible negative associations tied to this. Younger people, in particular students, showed a higher intention to participate. The paper discusses the resulting opportunities for increasing user uptake and motivation that could be pursued through communication and the design of the crowdshipping service.

1. Introduction

Cities worldwide experience growing congestion, which in turn negatively affects the economy, the environment and liveability. Continued growth in e-commerce compounds the problem, as freight vehicles account for a significant share of traffic and contribute to congestion (Taniguchi et al., 2016; Allen et al., 2018). Additionally, last mile delivery undermines road safety through second-row parking and the blocking of cycle and pedestrian paths (Groth et al., 2019).

New consumption patterns put pressure both on delivery costs as well as on the traditional professional delivery chain. Customers expect delivery at a low cost, while convenient delivery is a growing part of e-commerce products and customer satisfaction. The demand for fast deliveries reduces the possibilities for consolidation and thereby reduces stocking efficiency, accelerating the problem even further (Chen et al., 2018). Transport companies are relatively effective in consolidating and optimizing large and regular flows of goods (e.g. port-to-port, port-to-delivery central, central-to-central) but consolidation of the later parts of the delivery-chain is a complex and costly process, which does not

harmonize with the aforementioned requirements of the new consumption patterns and with the extremely low value of transport in the actual system (W. Zhou and Lin, 2019). This results in inefficient and environmentally taxing delivery patterns based on a system that has difficulties with accommodating this new demand. The 'last mile' of delivery therefore accounts for up to 50 % of total delivery costs (Rodrigue et al., 2016) and is the most inefficient, pollutive stage of the e-commerce supply chain (Macioszek, 2018; Pourrahmani and Jaller, 2021; L. Zhou et al., 2016).

More resource and space efficient solutions might lie in utilizing spare transport capacity in cities through new technologies in order to organize the use of resources differently, as it has been done by a vast amount of sharing economy concepts in a broad range of fields within the last decade (Heinrichs, 2013). Within the field of personal transportation, this has resulted in car- and ridesharing concepts that have been broadly adopted for years by now (Hartl et al., 2018). Within the domain of freight transport, the fact that people travel within and around cities on a daily basis for commuting, leisure and social purposes is being utilized. They represent a significant and relatively cheap

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transport capacity, in particular if they make use of non-dedicated trips. At the same time, the possibility for rethinking the divide between freight and passenger transport expands, in parallel with the development towards more intelligent mobility systems and ICT use. Influenced by the sharing economy paradigm, this has resulted in terms such as ‘crowdsourced logistics’, or ‘crowdshipping’ (e.g. Le et al., 2019).

This paper aims to investigate the potential and accompanying contingencies for user-uptake of a crowdshipping solution that combines the concept of Automated Parcel Lockers (APLs) with public transport. Such a solution has been researched hypothetically based on stated preference experiments (Fessler et al., 2022; Gatta et al., 2018, 2019; Serafini et al., 2018; Simoni et al., 2020) and recently been tested in practice in Copenhagen (Fessler et al., 2023a) informed by the results of this paper. While the test provided information about people engaging in the service, limited knowledge is available on the motivators and barriers in the general population this service could be targeted at. Existing studies focused on demographic characteristics and specific service attributes, such as the placement of APLs (e.g. Rabe et al., 2020; Iannaccone et al., 2021) as well as potential environmental effects (e.g. Karakikes and Nathanail, 2022; Kizil and Yildiz, 2021; Peppel and Spinler, 2022). Yet, a theoretically efficient and well-designed service is of little help if it is not accepted by its intended users. This paper addresses this issue by investigating the psychological factors related to the intention to participate in the concept. Due to missing knowledge on barriers and facilitators, we first explored these in qualitative interviews with point of departure in the Theory of Planned Behaviour (Ajzen, 1991). The qualitative results informed a subsequent standardised survey, which was used to identify the significant factors related to user intention in a representative sample of public transport users in the Capital Region of Denmark. The gained knowledge presented in this paper informed the design and communication of the test trial in Copenhagen and will be useful for any realised concept. The following section provides more details on the concept (Section 2.1), describes the theoretical framework (Section 2.2), and specifies the contribution of the paper further (Section 2.3).

2. Background

2.1. Crowdshipping as last mile solution

Possible solutions to the abovementioned challenges might lie in designing delivery chains that can incentivize individuals to offer their transport capacity in order to address the increasing number of deliveries produced by e-commerce business models, while accommodating for lower delivery costs and avoiding the creation of a proletariat of delivery workers, like Uber has done for taxi services. Public passenger transport is one domain in which the possibilities for utilizing existing transport capacity through sharing economy principles represent an opportunity for assessment (Zhu et al., 2023).

In the solution proposed in this study (see Fessler et al., 2023a for more details), APLs are placed at public transport stations and stops, in the immediate vicinity of where passengers naturally pass by. In connection with public transport trips, registered passengers are then offered the possibility to bring a parcel along with them. Through a mobile app, passengers can book the parcel(s) that match(es) their route. Before departure, they can then use the app to open the relevant locker through bluetooth connection to bring along the parcel on their trip. Upon arriving at their stop, the passenger hands in the parcel at the designated APL in the same way. Crowdshippers are compensated with credit for the transit system.

Most prior research on crowdshipping – as well as the implemented solutions thus far – has focused on transport capacity of private car drivers and other transport forms where dedicated trips in the form of detours are to a smaller or greater extent unavoidable (e.g. Punel and Stathopoulos, 2017; Allahviranloo and Baghestani, 2019). For this reason, such concepts based on private vehicle use often result in higher

emissions (Buldeo Rai et al., 2018). The potential for a public transport based crowdshipping concept was more recently examined in a series of papers (Fessler et al., 2022; Fessler et al., 2023b; Fessler et al., 2023a; Gatta et al., 2018, 2019; Serafini et al., 2018; Simoni et al., 2020). In a theoretical case study of Rome, the willingness to act as crowdshippers (supply side) and to receive parcels delivered by a crowdshipper (demand side) as well as how the features of a potential service affects this was examined. In a stated preference survey, Serafini et al. (2018) identified the most important features influencing the inclination to participate in a crowdshipping service and used discrete choice models to study the underlying behaviour. The importance of various shipment characteristics were investigated by Fessler et al. (2022). The concept was also tested out in a full-scale field experiment, where viability was validated from a user perspective, with a high degree of acceptance (Fessler et al., 2023a). Further, habit formation for the concept was explored by Fessler et al. (2023b), where it was found that anticipating positive emotions from participation leads to higher habit formation and that this may be further supported by in-app feedback with an environmental (rather than economic) focus.

2.2. Theoretical framework

To examine the psychological factors of participation in the suggested crowdshipping solution, we use the Theory of Planned Behaviour (TPB) (Ajzen, 1991) as a point of departure. The theory has been successfully applied to explain a wide variety of behaviours, including mode choice (e.g. Bamberg et al., 2003; Donald et al., 2014), departure time choice (Thorhauge et al., 2016), as well as the intention to use car sharing (Zhang and Li, 2020; Mattia et al., 2019).

According to TPB, intention is the main determinant of behaviour (Ajzen, 1991). Intention is shaped by (1) Attitude toward behaviour, (2) Subjective Norms and (3) Perceived Behavioural Control. *Attitude* is the positive or negative evaluation of a given behaviour. *Subjective Norm* (SN) is the perceived support by important others and *Perceived Behavioural Control* (PBC) refers to the perceived ease or difficulty of performing the behaviour.

In relation to the examined crowdshipping service, it appeared relevant to expand the TPB by several psychological constructs. Perceived Mobility Necessities (PMN, Haustein and Hunecke, 2007) could inhibit the uptake of the service for people who already perceive their life as requiring a (too) high level of mobility and therefore prefer individual transport modes (Thorhauge et al., 2020). However, for public transport commuters with high PMN it could also be easier and more efficient to integrate crowdshipping activities into their daily commuting habits.

Reviewing the motives related to the participation in other sharing economy concepts, Andreotti et al. (2018, p. 12) concluded that “instrumental motives (economic/monetary, sometimes in combination with functional motives, such as convenience), normative motives (primarily geared towards sustainability, but also altruism), and social-hedonic motives (including enjoyment as well as community/social motives)” are most relevant in previous research. In the context of TPB, normative motives are covered by SN – but in the context of environmental behaviour, it has been found relevant to additionally consider Personal Norm (PN). PN is the central variable of the Norm Activation Model (NAM) (Schwartz, 1977) and defined as the perceived personal obligation to help others (or the environment). Kim et al. (2018) recently integrated assumptions of the TPB and NAM in a joint framework to explain the use of sharing services and showed a significant effect of PN in addition to the TPB constructs Attitude, SN and PBC.

To cover the social-hedonic motives that Andreotti et al. (2018) found relevant for participation in sharing economy, it seems relevant to consider the concept of *Relatedness* (Alderfer, 1969). In a study that examined the intention to share public transport information through a collaborative transit app, aspects of Relatedness had by far the highest effect on the intention to share information with other travellers (Sarker et al., 2019). With an increase in climate change-focused activism and

participation in social movements (Fisher and Nasrin, 2021), there is arguably a greater potential for studying how feelings of Relatedness to likeminded people affect intentions within a broad range of mobility choices, including the intention to participate in the proposed crowdshipping concept.

2.3. The present study

This paper aims to add to the field of research on crowdshipping by employing constructs derived from an extension of the Theory of Planned Behaviour in order to assess relevant demographic and psychological factors for user uptake of a public transport based crowdshipping concept. The challenges and opportunities described in the previous sections, point to the need for an understanding of the preconditions for implementing crowd-based solutions to current and upcoming transport problems in a feasible manner. To make the outlined crowdshipping solution as appealing to take part in – and thus as effective – as possible, it is important to understand the motivations, barriers and socio-spatial contexts that exist among and around the potential users of such solutions. This is a necessary first step towards applying relevant behavioural interventions.

To examine the motivational drivers and barriers influencing the intention to participate in public transport based crowdshipping, we use a mixed methods approach.

Mayring (2001) distinguishes four different ways of combining qualitative and quantitative data. In the pre-study model, which we applied, qualitative data is collected with the main purpose to prepare the following quantitative data collection. In our case, the qualitative study (Part 1) served two purposes: first, to inform the design of a standardised questionnaire used in a representative survey (Part 2 of this paper); and second, to inform the design of a crowdshipping experiment, in particular related to the communication of the service and incentives (for related results see Fessler et al., 2023a; Fessler et al., 2023b) and thereby also the design of a realised concept.

In Section 3, we report the method and results of the qualitative part, followed by the quantitative part in Section 4. Thereafter, findings and implications for public transport based crowdshipping concepts specifically, and sharing economy concepts more generally, are discussed in Section 5.

3. Part 1: Qualitative study (in-depth interviews)

3.1. Method

In an initial exploration of motivational factors and barriers relevant for assessing the acceptance of the crowdshipping concept, in-depth interviews were conducted. As research on the topic of public transport-based crowdshipping is very limited, this explorative phase was crucial in ensuring that scenarios described and assessed quantitatively in the subsequent survey, make sense to possible users and that all relevant motivations and barriers are included. Semi-structured interviews were conducted to ensure that certain themes were being covered, while being open to any new themes that appeared during the interview.

3.1.1. Sampling

The sampling was based on the broadest possible target group for the service, namely all potential public transport users in the Copenhagen area aged 18 and above. Because of the narrow study focus and the established theoretical background that guided the interview, a small sample in a range of 10–15 participants was considered sufficient (Malterud et al., 2016). In line with the grounded theory approach that has been applied to explore motivations behind travel mode choice (e.g. Gardner and Abraham, 2007; Schikofsky et al., 2020), data collection was stopped when saturation was achieved (Francis et al., 2010). This resulted in 13 interviews of respondents aged 19–55 with a geographical

distribution encompassing both outskirts and central districts of Copenhagen (see Table 1). The spectrum of public transport use ranged from those using public transport in Copenhagen on a daily basis to those using it very rarely. The interview-length averaged 49 min.

3.1.2. Interview-guide

The interview guide covered all factors of the TPB – asking about what aspects people would like or dislike about the concept (Attitude), what potential challenges they saw (PBC), how they expected others to view the concept and their participation in it (SN) and if they could imagine to engage in the service themselves (Intention). The potential for feelings of community and engagement (Relatedness) was also brought into the interviews on this basis. Furthermore, transport habits and their compatibility to the concept were covered. The interview guide was divided into five sections.

- (1) *Public Transport.* The first section covered the respondents' use and preferences concerning public transport in the Copenhagen area. This provided insight into their regular as well as occasional transport needs and choices. Starting with broad questions about their daily mobility choices and habits, the focus shifted towards public transport options and their respective (dis)advantages. To avoid bias, the crowdshipping concept and focus of the research project was not introduced until after this section.
- (2) *Concept introduction and initial thoughts.* Participants were asked about their initial thoughts on it and who they expected to be the most frequent users. The open(ing) question was intended to inform a correspondingly broad range of items, such as attitudinal variables concerning personal advantage and symbolic motives.
- (3) *Practicalities.* Interviewees were then asked about possibilities and preferences for receiving information about available parcels matching their route. They were then given the opportunity to pinpoint practical preferences and barriers through an imagined scenario with point of departure in their own use of public transport.
- (4) *Concept, users and motivation.* To elevate the focus from practicalities of using the service to what the participants thought of the overall concept, they were asked questions on whether they thought others might use the service and why. This projective technique was intended to facilitate considerations about possible motivations to use the service, without having to take point of departure in themselves, allowing for a broader range of themes, some of which might have been difficult to articulate in an interview setting (Donoghue, 2010). For example, some participants might feel uncomfortable or embarrassed about mentioning the economic compensation as their primary driver. These insights on the participants' assessment of the service were

Table 1
Sample characteristics.

Sample	Cover name	Gender	Age	Occupation	Main transport mode
	Victor	M	18	Student	Metro
	Daniel	M	23	Student	Metro
	Michael	M	29	Student	Bike
	Pierre	M	34	Employed (full time)	Bike + S-train
	Kristian	M	39	Employed (full time)	S-train
	Jonas	M	53	Employed (full time)	S-train & Metro
	Rebekka	F	19	Student	S-train + bus
	Line	F	23	Student	Bike
	Didde	F	27	Student	Bike
	Karen	F	28	Student	Bike + S-train
	Henriette	F	46	Employed (full time)	Bike + S-train
	Lotte	F	55	Employed (full time)	S-train
	Lone	F	55	Employed (full time)	S-train

also sought by asking them to relate the concept to a number of existing sharing economic companies with similar characteristics.

- (5) *Receiving parcels through crowdsourced logistics*. Interviewees were asked about their thoughts on the mode of delivery, with themselves being the recipient of the parcel.

3.2. Analysis

The interviews were transcribed and analysed using qualitative content analysis (Mayring, 2007). The data was thematically coded based on the themes that emerged from the interviews. As the topic of the interviews was very new, this inductive data-driven approach was applied to allow openness for novel and unexpected aspects. However, to make sure all theory-relevant themes were discovered, a deductive analysis was included alongside the inductive analysis. As proposed by for example Marquart et al. (2020), this was done to facilitate links to the relevant theory presented in the previous section. The outcome of this was an empirical underlining of the relevance of many concepts of the behavioural theories under consideration, as well as a range of new themes that emerged as a natural consequence of the novelty of the crowdshipping concept in question.

3.3. Results

This section summarises the results of the qualitative interviews. A more detailed description including quotes from the interviews can be found in the Appendix. Overall, the interviews supported the relevance of the constructs of TPB and its suggested expansions and delivered material for their operationalisation in a standardised questionnaire. The results in particular highlight the relevance of Relatedness, Subjective Norms (see Section 3.3.1.) and Perceived Behavioural Control (see Section 3.3.2) as elaborated in this section.

3.3.1. User motives and motives ascribed to providers

Several participants explicitly mentioned the social aspect of the service and highlighted being part of a network, community, or social movement as a motivating factor for participation, which reflects the relevance of the construct of Relatedness. Connected with that, we identified potential for evoking positive feelings as a result of helping others through one's participation. This indicated the relevance of adding the construct of 'Warm Glow' (Taufik, Bolderdijk and Steg, 2015) to the survey, a construct which has previously been used to account for the moral satisfaction associated with an environmentally friendly contribution (e.g. Kahneman and Knetsch, 1992; Bagozzi, Gopinath and Nyer, 1999; Hartmann et al., 2017). Yet, the potential to evoke positive feelings was closely connected with the associations to the company that drives the service and ascribed green versus economic motives. If the service was mainly driven by economic motives and subject to "green-washing", user acceptance seemed at risk. These results highlighted the need to address the potential perceived contrast between the idealistic motives of a crowdshipping concept and underlying profit motives of an operator.

Also for potential users themselves, there was some ambiguity between economic and environmental motives. For some participants, the personal economic aspect served as a clear primary motivator, and they also believed this to be the case for others, even though they might not be open about it. Environmental awareness was mentioned by many interviewees as a possible motivation for early adopters of the service. The contribution of emission reduction was often mentioned in relation to intrinsic motivations to mitigate environmental issues through own actions.

When asked directly, none of the interviewees mentioned that they would be embarrassed to participate. This contrasts prior research on workers in the "traditional" sharing economy, where it was found that (perceived) stigma and a simple focus on money rather than sharing lies in stark contrast to the presented idealistic and empowering visions of

many sharing economic platforms. A possible explanation for the contrast to earlier work might be that the proposed crowdshipping concept cannot be utilized as a 'gig economy'-alternative to traditional employment. For many interviewees, the reduced fare of the ride or a discount, seems to evoke and be more in line with the positive feelings of doing good for others and other idealistic values, where they associate ready money with a colder and transactional nature, with potentially accompanying negative influence on own and others' valuation.

No matter if participants were mainly motivated by economic or environmental factors, users overall agreed that the economic aspect should not be highlighted in the promotion of the service – enabling users to justify their own participation to important others by environmental motives, pointing to the relevance of social norms. Without participants addressing it directly, there seemed to be a risk of negative evaluations or social stigma, such as being labelled a "discount hunter" or being associated with delivery workers. This may be alleviated by the positive environmental gesture that participation represents, and the divergent effect for identity construction of work undertaken in the sharing economy sphere.

3.3.2. Practical and mental barriers

Ease of use was seen as the key to the services' success. When participation would take too much time, make the trip less comfortable or add too high complexity to the trip, participants would opt out. The service would need to be smoothly integrated into the users' travel habits. These results also suggested that it was relevant to consider travel satisfaction as a factor influencing the uptake of the service. People by forehand not satisfied with their public transport trip, might be less open to add further complexity. In addition, there is a task of overcoming mental barriers of participating for the first time. First time use of new mobility solutions can be challenging, and lacking experience with related concepts may amplify perceived complexities.

Apart from more general aspects related to ease of use, we identified three main types of mental barriers to participation. The first concern mentioned by many of the respondents was liability if the parcel was damaged or lost. The second concern was about safety and the risk of transporting something illegal. The third concern was about practicalities, such as not being able to hand in the parcel at the destination due to technical issues, or the phone running out of battery. The diverse range of concerns raised during the interviews illustrate the importance of communicating effectively to potential users in order to address the mental barriers to participation in a novel concept such as public transport based crowdshipping.

4. Part 2: Quantitative study (survey)

4.1. Method

4.1.1. Procedure and participants

The data for the second part of this study is based on an online survey. It was distributed in May/June 2020 to inhabitants of the Capital Region of Denmark. Besides residential location, use of public transport on at least monthly basis was a requirement for participation. A representative sample in terms of gender, age and education was drawn from EPINION's (a market research institute) online panel. In total, 1989 surveys were initiated, of which the majority were screened out for not fulfilling the participation requirements. After cleaning the data by removing completed responses finished in less than 40 % of the median duration as well as removing responses from participants with suspicious answer patterns, the final sample consisted of 524 respondents (261 women, 259 men, 4 other or not disclosed). A comparison of the sample with public transport users in the National Danish Travel survey revealed an overrepresentation of older people in this sample, which may be explained by a different operationalisation of being an active public transport users in both studies. For more detail on the sample, see Fessler et al. (2022).

The respondents were explicitly instructed to answer based on their lives and transport habits prior to the COVID-19 outbreak, as the country was in lockdown at the time of data collection.

4.1.2. Measures

In the operationalization of theoretical constructs, validated items were adapted from the literature and new items were created, informed by the results of the qualitative interviews (Study 1). The selection of items was additionally informed by the result of a pre-test and a principle component analysis (PCA), in which some theoretical constructs fell on the same factor. We aimed to measure the previously identified factors reliably, rather than all single theoretical constructs separately, as the latter would have resulted in a too long survey. Therefore, several theoretical constructs were measured with a limited number of items.

- *Intention* was measured with six items, of which each participant answered four (see Table 3 for item list). First, all participants responded to “How often would you make use of the opportunity to check in and out with packages if there were always packages to bring?” with two items that cover different trip-types (most used route in Copenhagen area and other public transport trips in Copenhagen area). Second, the participants responded to one of two separate two-item sets of questions (compensation presented to participants as ‘50 % discount on trip fare’ or the equivalent reduction in cash). These two sets were based on a presented example with more details as well as an accompanying photo of the parcel in question as illustrated in Fig. 1. Each participant was randomly assigned one of these two-item sets, and thus only answered four of the six intention items.
- Social aspects around participations seems of particular relevance for participations and were covered by the constructs *Subjective Norm*

and *Relatedness*. Subjective Norm was represented by an item on whether participants imagine their friends to participate. Relatedness was represented by two items that measured the potential positive feelings of being part of a movement/community (both adapted from Schikofsky et al., 2020). Similar as in Sarker et al. (2019), we expected both constructs to load on a joint factor.

- The construct *Warm Glow* (three items) was added to additionally cover whether participation was thought to elicit positive emotions derived from the contribution towards a societal need and environmental protection (Taufik et al., 2015; Venhoeven et al., 2013).
- *Personal Norm* was measured by one items on the personal obligation to take the environment into consideration in transport choices. In addition, *Awareness of need* with regard to climate action was measured with two items.
- Included *Attitudes* focused in particular on perceived fairness and status.
- *Perceived Behaviour Control* was measured with three items on the perceived ease/difficulty and time-consumption of participation. In addition, more specific barriers towards participation were measured with ten items created for the purpose. Of these, five items focused on liability issues in case of damage to the package caused by oneself or others, risk of theft/robbery and fear of transporting dangerous/illegal goods. Three items focused on the risks of forgetting the parcel and thus not handing it in, or not being able to hand it in due to the phone running out of battery. Two items measured the fear of a faulty system, such as technical issues or not being able to find the package locker.
- *Perceived Mobility Necessities* were measured by two items assessing the perceived mobility needs resulting from participants’ daily life (Haustein and Hunecke, 2007).

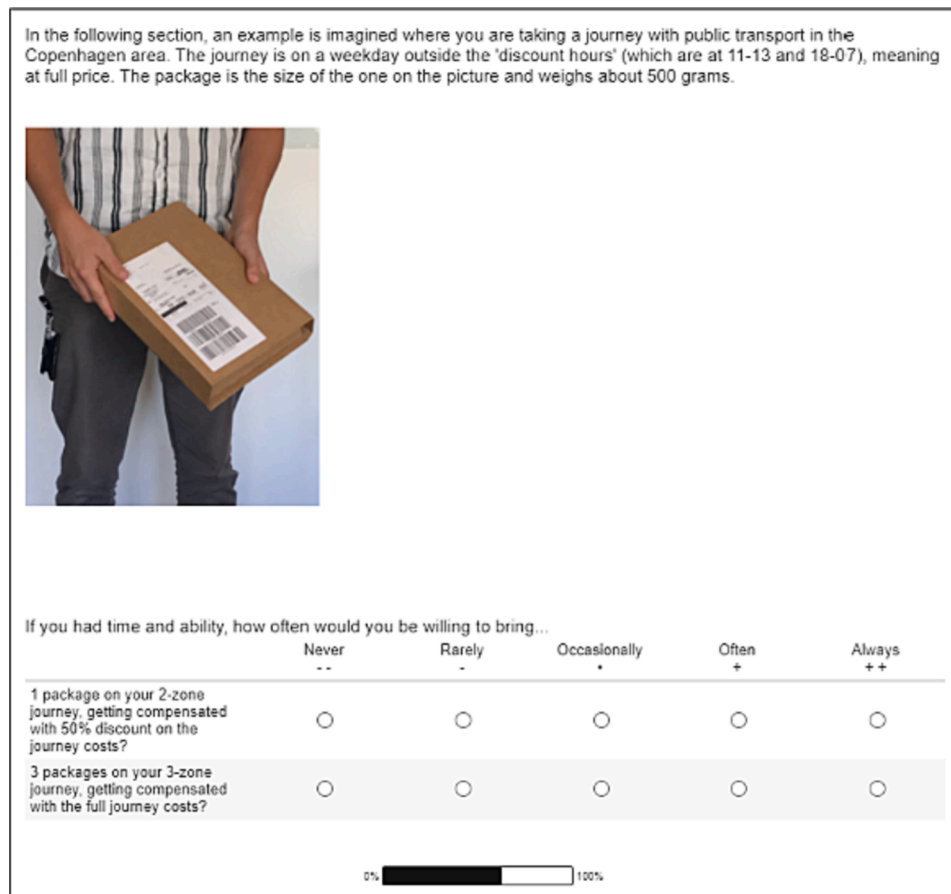


Fig. 1. Intention-item (% discount).

- Two Satisfaction with Travel Scale (STS) sub-scales, *Time* and *Comfort*, were included with respectively three and four items. The *Time* items measured whether the participant in relation to their most frequent journey felt stressed, hurried and worried about arriving on time (Ettema et al., 2011). *Comfort* was measured with three items on the ease, functioning and comfort of the trip (Ettema et al., 2011), and one item created for the purpose of measuring the degree to which the participant feels safe on the trip.

In addition to psychological variables and information on public transport travel patterns, sociodemographic variables were collected regarding postal code of residence, age, gender, household composition (living with children/partner/parents/other adults), income, monthly public transport expenses, employment status (eight categories), work hour flexibility (fixed/flexible work hours) and education (seven categories).

4.2. Analysis

In order to reduce the number of psychological variables to their underlying dimensions, a principal component analysis (PCA) was performed using varimax rotation. The PCA resulted in six factors, which explained 61.8 % of the variance (see Table 2).

The items showed allocations to the factors as expected based on the pre-test results: Items related to Subjective Norm, Relatedness and Warm Glow formed a common factor, which measures positive feelings around participation, perceived social support and perceived value of participation, which we refer to as ‘Anticipated Social value and Positive

emotions’ (ASP). The new factor ‘climate norm’ includes Personal Norm as well as items on Awareness for need in terms of climate action. Perceived mobility necessities (PMN) built a separate factor as expected. The five items related to exploitation as cheap labour and the symbolic values of the service built a common factor (Concept Attitude), but fell together with the three items for perceived behavioural control (PBC). Although loading on the same factor, the items for PBC were treated as a separate factor, as there is a clear conceptual distinction between the control and competence oriented PBC-items and the attitudinal items evaluating the concept with a moral and symbolic focus. The more specific concept related barriers formed two separate factors. One consisted of seven items on risks resulting in the parcel not being handed in by the participant (Parcel Hand-in Concern). The other factor encompassed three items on dangers further beyond control of the participants; transporting something illegal or dangerous or being liable for a parcel damaged somewhere else in the delivery chain (System Risk Concern).

With Cronbach’s alphas above 0.7, all resulting factors have acceptable internal consistencies. Based on the allocations presented in Table 2, and the separation of PBC and Concept Attitude, six mean scales were calculated.

A separate PCA was calculated for the items related to the Satisfaction with Travel Scale (STS) sub-scales *Time* and *Comfort* and the added item on safety. The PCA resulted in one common factor with all factor loadings above 0.76. As a differentiation between sub-scales was not relevant in the context of this study, we calculated a mean scale including all STS items, resulting in a high internal consistency (Cronbach’s alpha = .92).

Intention to participate in the service was operationalized by six

Table 2
Principal component analysis.

Item	ASP	Concept Attitude and PBC	Climate norm	PMN	Parcel Hand-in Concern	System Risk Concern
Many of my friends would participate in the concept. (SN)	0.596	-124	-0.004	0.032	0.060	-0.211
I would feel a community spirit with the other users. (R)	0.742	-0.050	0.117	-0.032	-0.041	-0.027
I would feel part of a positive movement. (R)	0.793	-0.278	0.178	0.041	-0.034	0.005
I would feel good about having made a small difference for the environment and my city. (WG)	0.806	-0.197	0.203	0.109	-0.013	0.076
For me, it would give value to participate. (WG)	0.757	-0.309	0.071	0.055	-0.062	-0.043
I would feel proud to do my small part in making the city greener. (WG)	0.785	-0.219	0.223	-0.037	-0.033	0.021
It would be a bit embarrassing to meet someone I know, while I was picking up/delivering a parcel. (status)	0.042	0.635	-0.144	0.089	0.210	0.046
I do not want to be associated with parcel couriers. (status)	-0.121	0.720	-0.085	0.054	0.097	0.088
Participation is only for ‘discount hunters’. (status)	-0.196	0.604	-0.115	-0.044	-0.016	0.002
It is mostly the involved companies that gain from the concept, not the participants. (fairness)	-0.348	0.454	0.061	0.102	0.129	0.272
The concept would unfairly take advantage of me as a form of cheap labour. (fairness)	-0.316	0.508	-0.005	0.017	0.120	0.411
It would be difficult for me to bring parcels on my journeys. (PBC)	-0.268	0.646	0.034	-0.051	0.206	0.061
The whole process of downloading an app and signing up would be too much hassle for me. (PBC)	-0.257	0.471	-0.110	-0.013	0.262	0.034
Bringing packages on my journeys would be too time consuming. (PBC)	-0.349	0.627	0.051	0.015	0.123	0.053
I feel personally obliged to take the environment into consideration in my transport behaviour. (PN)	0.232	-0.049	0.744	0.086	-0.023	0.115
Climate change is currently society’s most important issue to address. (AN)	0.200	-0.010	0.817	0.091	0.057	-0.003
The fight against climate change has become too hysterical. (Recorded) (AN)	0.118	-0.207	0.782	-0.048	0.035	-0.106
The organisation of my everyday life requires a high level of mobility.	0.028	0.011	0.040	0.900	0.144	0.033
I have to be mobile all the time to meet my obligations.	0.064	0.058	0.077	0.892	0.066	0.045
<i>I would be nervous about...</i>						
... forgetting the parcel and not getting it handed in the locker.	-0.081	0.141	-0.017	0.029	0.774	0.010
... the package being robbed/stolen on the way.	-0.013	0.150	-0.032	0.054	0.623	0.348
... not being able to find where the package should be handed in.	0.027	0.206	0.021	0.011	0.751	0.187
... not being able to open the locker due to technical difficulties.	0.032	0.113	0.061	0.034	0.749	0.190
... not being able to open the locker because of my phone running out of battery.	0.037	0.193	-0.023	0.056	0.728	0.161
... accidentally damaging the parcel.	-0.090	0.007	-0.04	0.054	0.665	0.401
... forgetting to hand in the parcel and accidentally bringing it with me.	-0.079	0.105	0.046	0.094	0.809	-0.055
... that I might transport something dangerous.	-0.035	0.221	-0.034	0.052	0.331	0.774
... that I might transport something illegal.	-0.029	0.143	-0.003	0.025	0.347	0.783
... what I might be liable for, if the package is damaged somewhere else in the transport chain.	-0.074	-0.083	0.077	0.018	0.522	0.567

items (see Section 4.1.2), which were likewise compiled to a mean scale. Cronbach's alpha for these were respectively 0.89 for interviewees presented with compensation formulated as percentage discount in their last two items and 0.88 for those presented with compensation formulated as monetary value.

In the data analysis, we will use the variables directly related to the concept (ASP, Concept Attitude, PBC, Parcel Hand-in Concern, System Risk Concern, Intention) to describe participants' attitudes, barriers and intention around the new concept as well as related differences for demographic sub-groups. Group differences were tested for significance in ANOVAs including post hoc test with Bonferroni correction.

Subsequently, we examined how psychographic as well as socio-demographic factors are related to the intention to participate in the service when jointly included as independent variables in a linear regression modelling intention.

4.3. Results

The following section will first present descriptive results related to the adoption of the service by various sociodemographic groups. Subsequently, we examine how psychographic as well as sociodemographic factors are related to the intention to participate in a linear regression analysis.

4.3.1. Acceptance of the service by different demographic groups

Table 3 provides an overview of how people evaluated aspects of the service. In line with the responses of the qualitative interviews, the positive feelings associated with doing a small difference for the environment and one's city, as well as feeling part of a positive movement, stand out as the motivational aspects resonating the most with participants. The greatest concern relates to liability, in case the parcel should be damaged somewhere else in the delivery chain, followed by the concern of oneself accidentally damaging the parcel. Again, this was a common theme brought up by the qualitative interview participants.

We examined how demographic groups differed in psychological factors directly related to the service, to provide knowledge on the acceptance of the service in these groups. In the following, we report significant mean differences with relevant effect sizes ($\eta^2 > 0.02$).

When looking at gender differences, we find that women showed slightly (but significantly) higher scores in ASP ($M = 3.25, SD = 0.75$) than men ($M = 3.01, SD = 0.84$), $F(1, 518) = 12.03, p = .001, \eta^2 = 0.023$ but had higher concerns with regard to parcel hand-in ($M = 3.21, SD = 0.81$) than men ($M = 2.96, SD = 0.86$), $F(1, 518) = 11.52, p = .001$, as well as higher system risk concerns (women: $M = 3.44, SD = 0.85$) (men: $M = 3.27, SD = 0.98$), $F(1, 518) = 4.60, p = .032, \eta^2 = 0.022$.

Significant differences were also found between age groups concerning ASP, $F(3, 520) = 5.71, p = .001, \eta^2 = 0.032$. Post hoc comparisons showed that in particular the youngest age group ($M = 3.40, SD = 0.67$) differed significantly from the '40 – 64'-group ($M = 3.08, SD = 0.82, p = .035$) and the oldest age group ($M = 2.96, SD = 0.77, p = .002$).

In terms of PBC, the oldest group perceived the highest difficulties related to service participation ($M = 3.29, SD = 0.87$) and the youngest group the lowest ($M = 2.61, SD = 0.73$), $F(3, 520) = 11.54, p < .001, \eta^2 = 0.062$. There were also significant age differences in intention, $F(3, 520) = 18.00, p < .000, \eta^2 = 0.094$. Post hoc results showed largest differences between the oldest age group and the two youngest groups ($p < .001$).

Amongst the occupation categories, significant differences were found for ASP, $F(4, 519) = 7.04, p < .001, \eta^2 = 0.051$. Post hoc results showed that Retirees ($M = 2.92, SD = 0.81$) significantly differed from Non-working ($M = 3.25, SD = 0.73, p = .040$) and Students ($M = 3.54, SD = 0.70, p < .001$). Students who had the highest intention also differed significantly from the Working group ($M = 3.09, SD = 0.81, p < .001$).

Significant differences were also found for PBC, $F(4, 519) = 8.54, p < .001, \eta^2 = 0.062$. Yet, post hoc results for PBC showed that only

Table 3
Acceptance of service.

Factors and Items	Agree % ^a	Mean	SD
ASP			
Many of my friends would participate in the concept.	19	2.81	0.88
I would feel a community spirit with the other users.	27	2.85	1.02
I would feel part of a positive movement.	45	3.32	1.06
I would feel good about having made a small difference for the environment and my city.	48	3.37	1.05
For me, it would give value to participate.	41	3.14	1.09
I would feel proud to do my small part in making the city greener.	40	3.25	0.97
ASP mean scale		3.12	0.80
Concept Attitude			
It would be a bit embarrassing to meet someone I know, while I was picking up/delivering a parcel.	11	2.13	1.02
I do not want to be associated with parcel couriers.	20	2.62	1.09
Participation is only for 'discount hunters'.	23	2.88	0.99
It is mostly the involved companies that gain from the concept, not the participants.	30	3.12	0.95
The concept would unfairly take advantage of me as a form of cheap labour.	30	2.97	0.95
Concept Attitude mean scale		2.75	0.72
PBC			
It would be difficult for me to bring parcels on my journeys.	35	3.07	1.13
The whole process of downloading an app and signing up would be too much hassle for me.	27	2.73	1.17
Bringing packages on my journeys would be too time consuming.	30	3.00	1.04
PBC mean scale		2.93	0.89
Parcel Hand-in Concern - I would be nervous about...			
... forgetting the parcel and not getting it handed in the locker.	37	3.02	1.12
... the package being robbed/stolen on the way.	34	2.97	1.11
... not being able to find where the package should be handed in.	42	3.18	1.07
... not being able to open the locker due to technical difficulties.	46	3.27	1.08
... not being able to open the locker because of my phone running out of battery.	34	3.01	1.12
... accidentally damaging the parcel.	43	3.28	1.06
... forgetting to hand in the parcel and accidentally bringing it with me.	34	2.93	1.15
Parcel Hand-in Concern mean scale		3.09	0.84
System Risk Concern - I would be nervous about...			
... that I might transport something dangerous.	37	3.13	1.10
... that I might transport something illegal.	43	3.26	1.12
... what I might be liable for, if the package is damaged somewhere else in the transport chain.	61	3.70	0.99
System Risk Concern mean scale		3.36	0.92
Intention			
<i>How often would you make use of the opportunity to check in and out with packages if there were always packages to bring?</i>			
... On your most used route in the Copenhagen area (outbound)	27	2.65	1.27
... On other journeys with public transport in the Copenhagen area	20	2.43	1.16
[picture and details] <i>If you had time and ability, how often would you be willing to bring...</i>			
... 1 package on your 2-zone journey, getting compensated with 50 % discount on the journey costs?	30	2.70	1.29
... 3 packages on your 3-zone journey, getting compensated with the full journey costs?	25	2.56	1.33
[picture and details] <i>If you had time and ability, how often would you be willing to bring...</i>			
... 1 package on your 2-zone journey, getting compensated with 8 kr.?	28	2.60	1.31
... 3 packages on your 3-zone journey, getting compensated with 20.5 kr.?	28	2.54	1.28
Intention mean scale		2.57	1.09

Notes: The answers to the underlying items were given on 5-point Likert scales.^a Percentage of participants who answered "agree" or "totally agree".

Retirees ($M = 3.29, SD = 0.91$) differed significantly from other groups; the Non-working ($M = 2.82, SD = 0.97, p = .002$), Working ($M = 2.87, SD = 0.84, p < .001$) and Students ($M = 2.59, SD = 0.71, p < .001$).

Lastly, significant differences were found between the occupation categories in intention, $F(4, 519) = 13.49, p < .001, \eta^2 = 0.094$. Again, the group of Retirees ($M = 2.09, SD = 1.04$) differed significantly from all other groups; the Non-working ($M = 2.72, SD = 1.07, p = .001$), Working ($M = 2.62, SD = 1.06, p < .001$) and Students ($M = 3.22, SD = 0.91, p < .001$).

4.3.2. Factors explaining the intention to participate in the service

A linear regression modelling the intention of participating in the crowdshipping service was calculated. The model included the psychological factors (see Section 4.1.2) and sociodemographic variables (see Section 4.1.3) with the constructed mean scale for intention as dependent variable. The results are presented in Table 4.

The model explains 65.2 % of the variance for the dependent variable. Six included variables were found to have a significant effect on the intention to participate in the crowdshipping service. ASP was by far the most important factor for intention to participate, indicating that feelings of being part of and doing your bit for a positive movement as well as anticipated social support are strong motivators for participation. PBC followed as the second most important psychological factor, with a negative impact on intention; as expected, perceived difficulties of signing up and bringing parcels is a demotivator. Also, a significant negative effect of the attitude related to status and fairness of the concept was found, indicating that symbolic values associated with the concept affect participation intention. Those who associate participation in the service with potential embarrassment and being exploited as a cheap source of labour were less inclined to participate.

Looking at the sociodemographics, the two youngest age groups are both found to be significant in their positive effect on the intention to participate compared to the reference age category '40 – 64'. When only including the demographic variables in a linear regression the occupation category Student shows significantly higher propensity to participate (model solely including demographic variables is not included in present paper). In the full model included in the present paper, the Student category is insignificant. This indicates that there is no significant effect in itself of being a student, but the effect should rather be

Table 4
Linear regression modelling intention to participate in the service.

Variable	B	SE B	β	p
Constant	1.182	0.440		0.008
Age: 25 and below	0.383	0.173	0.109	0.028
Age: 26–39	0.271	0.104	0.107	0.010
Age: 65 or above	-0.037	0.133	-0.015	0.783
Male	0.206	0.079	0.095	0.010
Higher education or not: Higher education	-0.059	0.098	-0.022	0.550
Living with partner	-0.061	0.096	-0.028	0.523
Living in central city districts	0.104	0.080	0.046	0.190
Living with kids	0.059	0.100	0.022	0.557
Occupation: Non-working	0.148	0.160	0.045	0.355
Occupation: Student	0.224	0.205	0.065	0.276
Occupation: Working	0.103	0.132	0.047	0.436
Personal income: Below median	-0.294	0.156	-0.073	0.060
Household income: Below median	0.069	0.114	0.026	0.545
Flexibly working hours	0.007	0.082	0.003	0.929
Monthly public transport expenses in Cph	0.046	0.019	0.084	0.018
ASP	0.713	0.060	0.527	<0.000
Climate norm	-0.048	0.044	-0.041	0.280
PMN	0.031	0.039	0.028	0.432
Concept Attitude	-0.148	0.071	-0.098	0.039
PBC	-0.286	0.059	-0.233	<0.000
STS	-0.021	0.044	0.018	0.637
Parcel Hand-in Concern	-0.031	0.061	-0.024	0.606
System Risk Concern	-0.023	0.053	-0.019	0.665

Note: All Variance Inflation Factors (VIF) were below 3.3. VIF above 5 or 10 indicate issues of multicollinearity (e.g. James et al., 2013).

explained by students' higher values in ASP, and lower expected difficulties (PBC) as shown in the descriptive analysis. Male gender is found as a significant factor of intention. However, the gender effect seems related to the different assessment of ASP by men and women: While there is generally no gender difference in intention (see descriptive analysis), gender becomes significant when controlling for women's higher scores in ASP.

Finally, a significant positive relation is seen between the respondents' monthly expenses for public transport and the intention to participate; those with higher expenses for public transport have higher participation intentions.

5. Discussion and conclusions

The present study explored the motivational drivers and barriers for participation in a public transport based crowdshipping concept.

The results point to the importance of considering three psychological factors: (1) perceived ease of use and convenience (PBC), (2) the anticipated social value from participation and positive emotions (ASP) and (3) the attitude towards participating in a commercially organized crowdshipping concept, including the potential negative associations tied to this (Concept attitude). This mirrors earlier work on motives related to participation in sharing economy concepts, where instrumental motives (economic as well as convenience), normative motives and social-hedonic motives were found most relevant (Andreotti et al., 2018). In our study, the social value aspect was clearly the most relevant factor, followed by perceived constraints. While with 65 % a considerable amount of variance in intention could be explained, additional factors, such as risk-aversion (Santana and Parigi, 2015), openness to experience or past experience with the sharing economy (Roy, 2016) may play a role and could be explored in future studies.

Age was found to be an influencing factor; younger people showed higher intention to participate. A slightly higher intention to participate amongst male respondents was found, but this was only significant when controlling for women's higher scores on 'ASP'. Monthly public transport expenses were also found to influence motivation to participate. No significant relation between the general satisfaction with travel by public transport and the intention to participate was found. As the qualitative interviews revealed, however, the travel context in which participation takes place – as well as passengers' (dis)satisfaction with this – should arguably still be taken into account when designing and applying a specific solution.

These findings could advantageously be implemented in a range of realization aspects, including communication and product development, in order to increase success in establishing and maintaining use. For example, the findings of the study suggest that communication to potential users should highlight the service as a user-driven movement in which the wish to help each other – in addition to doing something good for the environment – is central. This message seems especially important to convey to the youngest group of users (those below the age of 26). Not only is this group more willing to participate than their elder co-passengers. The quantitative results showed that the social aspects of the service also resonate significantly better with young people, meaning that they to a higher extent expect participation to elicit positive feelings and support from their social surroundings. The same could – albeit less strongly – be said about communication to the second youngest age group (26–39 years). If on the other hand, wanting to attract more participants at age 65 and above, results indicate that communication efforts to this group should focus on demonstrating the ease of use and on reassuring them that they are capable of participating, thereby addressing this group's higher PBC concerns.

Survey results indicate that the wish to do something good for others and the environment, and to be part of a positive movement (ASP), was more important than the perceived moral obligation to behave in a climate-friendly way (climate norm). Interview results indicated that highlighting the environmental and not the economic aspects, also

seemed relevant even for people who were motivated by the financial incentives, as they could use the green image to avoid any negative evaluations by others. This underlines the potential benefits of highlighting the green aspects tied to participation in communication efforts related to the service. Such messages could be made in combination with mentioning the economic incentive. However, the results could be interpreted to indicate not to mention the economic incentive independently from the environmental benefits in any outreach. It is worth noting, though, that the item on embarrassment related to participation noticeably stands out with the lowest mean score and none of the participants mentioned it as an issue for them personally; in general it does not seem like people would be embarrassed to participate, financially incentivized or not.

The weight given by many interviewees to the environmental and social ideals of the service, which was reflected in the regression results, also indicate incentivization opportunities that could be pursued through the design of the crowdshipping platform and its user interface. On the environmental side, feedback has previously been proven to be an effective tool (e.g. Fischer, 2008; Stern, 2011). In fact, habit formation for participation in the crowdshipping concept in question has been shown to be higher amongst participants with a degree of anticipated positive emotions related to social and environmental benefits. This habit formation was found to be further supported by environmentally focused feedback in comparison to economically focused (Fessler et al., 2023b). In future studies or realized concepts, feedback could be made more sophisticated by presenting calculated emissions savings to the participant upon hand in of the parcel, as explored in research on energy consumption behaviour change (Zangheri et al., 2019). On the social side, privacy settings allowing community-building could entail visible in-app profiles, for example making possible gamification which has previously shown to provide effective motivational tools within the transport domain (e.g. Yen, Mulley and Burke, 2019). Such elements could be monthly “highscorers” or daily lotteries with each transported parcel representing a ticket.

However, results also indicate the risk of backlash stemming from potential perceptions of the commercial setup of the service that contrast its communal and altruistically oriented ideals. In other words, all reasons should be avoided, that give ground to perceptions of the service as a greenwashed precarization of delivery, capitalizing on peoples’ good intentions. Such exploitative ventures have already been coined ‘sharewashing’ (Kalamar, 2013); an exploitation of the Warm Glow connected to the sharing economy (Curtis and Lehner, 2019). As is indicated in the interviews, the antidote to this is transparency around the organization in general and the cost- and compensation structure in particular. If such unfavourable perceptions of the service gain traction, results indicate that many will not be as willing to participate for the relatively small compensation. For other users who are more driven by instrumental motives, it may have less of a negative influence, as was found by Mikołajewska-Zajac (2016) in the case of the sharing economic platform Couchsurfing that turned from a non-profit to a for-profit enterprise. Here it was found that community- and altruistically driven users were very sceptical after the for-profit switch, while those with

Appendix

Detailed analysis of qualitative interviews.

The task of first-time use

The interview results highlighted the relevance of considering the whole context in which participation would take place. A link to travel satisfaction, especially concerning comfort, is underlined in the following interview quote:

“It sounds really cool, really smart. But in the case of the metro, I’m also thinking whether it should be excluded, maybe at certain hours. Because even if it is small parcels, if 30 students are bringing one, it

more instrumental attitudes viewed it as unproblematic, even favourable.

Although the present study has taken a multifaceted approach, where the economic incentive has received relatively little attention, this aspect should not be neglected. The results of this paper should thus still be considered in connection with other studies that show larger importance of the economic incentive in forming actual intention to participate (and not just forming positive attitudes towards it) (Hamari et al., 2016), and large scale surveys such as a US-based study on participation in the sharing economy where 86 % of respondents highlight economic outcomes, 78 % social outcomes, and 76 % environmental outcomes (PWC, 2015). However, as Böcker and Meelen (2017) argue from their Amsterdam-based study that also highlighted the importance of economic incentives, it is important to not conceive the sharing economy as one coherent phenomenon, as the relative importance of economic, social and environmental motivations will vary across sectors of the sharing economy as well as across cultural contexts.

Future work could advantageously pursue an investigation of the concept’s potential and its determinants in other cultural contexts, as well as of how motivation to participate might be furthered through the concrete app- and service-design. For future research it is also interesting to explore the interaction between the psychological constructs and a traditional econometric model through the use of an integrated choice and latent variable (ICLV) model.

CRediT authorship contribution statement

Andreas Fessler: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Funding acquisition. **Sonja Haustein:** Supervision, Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **Mikkel Thorhauge:** Writing – review & editing.

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Evaluations of transit experience concerning both time and comfort were correspondingly related to the interviewees' envisioned inclination to use the service, as illustrated in the above quote. Participation in a crowdshipping service would add complexity to a ride. The experienced contextual time pressure and stress-level would then easily influence the extent to which participation would 'tilt' passengers towards feelings of restlessness and unpleasantness.

"I don't know if I would do it myself. I think Rejsekort [Danish ticketing card] works pretty well. One would have to do it for idealistic reasons. My motivation wouldn't be to save a small amount of kroner [Danish currency] on public transport. But it would be to help minimize traffic in the city." (Lone, 55).

The need to accommodate the often habitual nature of public transport was therefore often indicated:

"The less you have to do other than bring a parcel, the more realistic it is. If it becomes routine. And that's probably the easiest. That daily trip, that they know 'I'm taking that'." (Lone, 55).

Signing up for the service and using it for the first time is a task that must compete heavily for a piece of potential user's limited attention span. In the domain of travel mode choice, habits have been shown to both reduce active search for choice-relevant information as well as the use of the information, leading to form barriers towards perceiving and processing counter habitual information (Verplanken et al., 1997). One interviewee, who misunderstood the concept and thought parcels were to be delivered directly to the recipient rather than the destination APL, expressed such initial barriers:

"If you only hear about it shortly, you think 'oh, that sounds troublesome, I'm not doing that (...). As with everything, once you find out how it works, I believe that you just think 'that's pretty smart'." (Line, 23).

Though this was not commonly addressed directly by the interviewees, we here see an expression of how lacking Perceived Behavioural Control can influence the intention to participate. Establishing the first time use of new mobility solutions has previously been documented as a trying task (e.g. Gao et al., 2020). Such initial troubles may be caused by the fact that similar concepts are not widespread. Participants might then have a correspondingly harder time drawing on associations to help understand the concept, as this interviewee does when asked if it reminds her of any existing sharing economic concepts:

"When you first introduced the project to me, I met it with greater scepticism than I do with a lot of other concepts. Because I think logistics are hard to imagine. And it's a part of the city I don't know yet. But something like GoMore [Danish ridesharing service] is an extension of hitchhiking. This [participating in the concept] is something you don't already do at all. It's more difficult for me to imagine than a GoMore lift. Or renting out your apartment (...). So it's all concepts for something that exist. And this feels more like a concept for something that doesn't exist. So I associate it with these things, but I still meet it with a greater mental blockade." (Karen, 28).

Though very few explicitly mentioned this as a problem, the majority of participants had a hard time directly associating the service with any existing sharing economic concepts. Almost all interviewees mention ease of use as the key to the concept's success. In the below quote, it is seen how previous negative experiences with novel mobility solutions might add mental blockades:

"It's all about how easy it is. For me to use it myself, it would be that it runs smoothly. I would spend two minutes extra to be at the station at some time and deliver it. But if I knew that it was like with the city bikes, that every second time it's flat, and every second time it won't open and this and that, then I would just think that I won't bother" (Michael, 29).

There were roughly three mentioned main types of mental barriers to participation, understood as the concerns given when prompted. The first concern mentioned by many of the respondents is liability if the parcel is damaged or lost:

"What if you lose the parcel underway? How would I ever prove that I didn't just bring home with me? Would it be with an insurance?" (Victor, 18).

"Just one concern, and that is the insurance issue. What if the parcel gets lost underway or stolen." (Jonas, 53).

The second concern is about safety and risk of transporting something illegal:

"Those organizing should of course guarantee that you aren't running around with a hand grenade or something like that." (Lone, 55).

"The only thing should be if there was a gun or something... So if I was stopped with it, I (need to be sure I) could say that I just brought it from her and transported it." (Michael, 29).

"Then you get a little paranoid. What's in the parcel, haha. Do you suddenly become a drug smuggler, because someone saw an opportunity, or are you bringing a bomb on the S-train..." (Henriette, 55).

The third concern is about practicalities, such as not being able to hand in the parcel at the destination due to technical issues, or the phone running out of battery:

“I would also have some concerns about what if you can’t hand in the parcel? For various reasons. And then have to run around with the parcel.” (Jonas, 53).

“... or the app should know that you are low on battery or something, where it can then recommend you not to do it.” (Rebecca, 19).

The diverse range of concerns raised during the interviews illustrate the importance of communicating effectively to potential users in order to address the mental barriers to participation in a novel concept such as public transport based crowdshipping.

For money or environment?

For some participants, the economic aspect served as a clear primary motivator, and they also believed this to be the case for others, even though they might not be open about it:

“90 % (of people’s motivation would be to) save money I would say. We talk so much about ‘green’ behaviour, but really how many people bother to do anything about it... It’s the money in it. I’m assuming it is for all.” (Kristian, 39).

Environmental awareness was mentioned by many interviewees as a possible motivation for early adopters of the service. The possibility to contribute towards a reduction in congestion and carbon emissions also underlined the need to address positive emotions that might be activated in response to living up to one’s own moral standards. The contribution of emission reduction was often mentioned in relation to intrinsic motivations and personally felt responsibility to mitigate environmental issues through own actions, such as in the following part of a response regarding imagined typical users of the service:

“Of course it would be nice to get some kind of subsidy to my commuter-card, but it is not essential for me that the price gets reduced... (Typical users could be) People who are advocates for sharing economy, who give importance to the climate challenges, that we need to bring down our CO2 emissions.” (Lotte, 55).

When asked directly, none of the interviewees mentioned that they would be embarrassed to participate. This contrasts prior research on workers in the “traditional” sharing economy, where it was found that (perceived) stigma and a simple focus on money rather than sharing lies in stark contrast to the presented idealistic and empowering visions of many sharing economic platforms (Ravenelle, 2017). This seems to mark a significant perceptual difference between ‘need to’ and ‘choose to’, as one interviewee also touches upon:

“(...) but I still think that there would be some who wouldn’t find it so nice. Especially, if they didn’t have that much money. If it became a necessary evil.” (Didde, 27).

Adding to this, a possible explanation for the contrast to earlier work might be that the proposed crowdshipping concept cannot be utilized as a ‘gig economy’-alternative to traditional employment, and accordingly is less significant for identity construction. This difference has also been shown amongst Uber drivers, who showcase *identity discrepancies* by highlighting how they merely take part in the sharing economy as opposed to having their identity defined by their occupation as is the case for regular taxi drivers (Phung et al., 2020). The difference between transport credit and money and positive effect on perception of the concept was addressed by several interviewees, such as in the following:

“Discount is definitely better than money.” (Karen, 28).

For many interviewees, the reduced fare of the ride or a discount, seems to evoke and be more in line with the positive feelings of doing good for others and other idealistic values, where they associate ready money with a colder and transactional nature, with potentially accompanying negative influence on own and others’ valuation. The sharing economy’s idealism/rationalism-duality, as found in Ravenelle’s (2017) work, is seen in expressions such as these:

“I would feel best about discount... whether they give me the money or the trip, it’s exactly the same but there would just be something about me not receiving anything as such, other than a trip that I took.” (Didde, 27).

“I don’t think in monetary terms, but I think it is nice if I can get out of having to pay for things” (Karen, 28).

More importantly, however, for the interviewees’ valuation of the potential evoking of such self-conscious emotions in relation to their own participation, seems to be the environmental aspect of the service.

“This is part of the education you want to give to your children. What kind of message. Because I don’t need my ticket reimbursed, right. For me, now that I’m a full time employee in a company, it doesn’t cost so much. So the money wouldn’t be the only attraction here. The idea of making some small gesture for the environment and also it’s nice to have less trucks in your city.” (Pierre, 34).

Most of the interviewees (n = 8) also explicitly point to the societal benefit as a mitigator when asked about possible embarrassment of participating. Even if this is not the actual main motivation, the positive environmental effects can then seemingly serve as a legitimization.

“But of course you can also just, if you don’t want to say that it is because of your financial situation, say that you do for environmental reasons.” (Line, 23).

This discrepancy between actual main personal motivation and the one she might present to peers, is expressed by this middle-aged interviewee:

“I might say that it (participation) was for the environment, but I would probably mostly do it for the money... My generation might think that it is a bit embarrassing to do it for the money, but if we can cover it up in it being for the sake of the environment, then it's okay.” (Henriette, 46).

This mirrors findings of earlier work in which differences are indicated between reported attitudes and actual behaviour; perceived sustainability was found to be an important factor in the formation of positive attitudes towards sharing economy, while economic benefits were found to be a stronger motivator for intentions to participate (Hamari, Sjöklint and Ukkonen, 2016).

“If it becomes the “save money” context, I think it would become more stigmatized. If (it talks to) the idealist, I think it will become more exalted... If you want to create a positive atmosphere around it, I wouldn't talk to the monetary-incentive” (Karen, 28).

Quotes such as the abovementioned on one side touch upon the theme of social approval and following social norms. Without many participants addressing it directly, the backside of the theme circled in the quotes, could equivalently be argued to be potential negative evaluations or social stigma. As the above examples and related literature illustrates, such fear of negative evaluations by one's peers could both be related to being labelled a “discount hunter” and with being associated with delivery workers, which may for some be an issue. However, this may be alleviated by the positive environmental gesture that participation represents, and the divergent effect for identity construction of work undertaken in the sharing economy sphere.

Part of something bigger – For better or worse

The participants were not only drawn to the idea of participating by the monetary and environmental gains. Many participants explicitly mentioned the social aspect of the service and the idea of becoming part of a larger movement as motivating factors:

“I think it would be really appealing to the segment I belong to, young people between 18 and 26, students... Because I know they would do it to save money, but it also looks extra good, that you are helping the environment and you are part of a new thing... I think people would think it is pretty cool. In that way, it would also work well that the project has a clear thought on sustainability. When joining, you are made aware that you are actually supporting something bigger.” (Rebecca, 19).

Though many participants had a hard time associating the practical participation with other concepts, the social/sharing aspect seems clear and in line with what many see as a positive movement:

“I think it is pretty cool. Also fits well with this wave of sharing. You carpool, eat together and repurpose food.” (Line, 23).

“I don't think of it as scary to go along with such a concept. Because people who sign up for something like that, they must have some idea about that we should help each other out.” (Lotte, 55).

This also pointed out by some participants as an opportunity for attracting new participants amongst parcel recipients, by making both recipient and crowdshipper feel included in a community:

“(...) Something that pulls you to also become a transporter. ‘Now you have ordered a parcel, which others help get to you. You will get double credit for your trip next time’. So it feels like you become part of a network instead of just clicking a button and thereby having bought a CO₂ compensation. It has to feel social.” (Karen, 28).

For some of the participants, the social aspect takes precedence over the environmental one:

“I think people would think it is cool, but not because of the environment. Because you would like your own parcels faster. Then you think ‘that's a pretty good deed’. I would be happy myself, if someone transported my parcel... So I hadn't even thought of the environmental aspect.” (Kristian, 39).

For some participants the underlining of the social aspect at the same time expresses clear divisions in their sympathy between involved people and enterprises.

“It's kind of cute. Like a ‘we help each other out’ vibe. I am contributing to someone getting support in their everyday life. I like that. That it goes to people in my everyday life, rather than a company. It of course also goes to a company, but it is more measurable to me how it affects people's life. And I trust people more than I trust [Freight provider]”. (Karen, 28).

This division has potential influence on these participants' willingness to participate and for what:

“You also can't help but wonder whose parcels it is in some way. There might be ones I would be more willing to bring. Who actually

profits from this. Of course there are congestion issues that are reduced, but there is also some commercial goal in this for

someone... for companies sending sports clothing is like okay it's about congestion issues, but its also a way you could save money as a company. Then it becomes commercial... and kind of a job... then you should maybe receive more money... Then I would feel kind of stupid, if I were hauling a load of parcels every day, without knowing to who" (Didde, 27).

For this reason, transparency is important, as another interviewee points out:

"It would be very good if there is transparency in which companies are involved... What am I supporting? Is there a profit dropping in someone's pocket? Which pockets? Is it a governmental organization, something where we are all a part of it. Or into some Amazonish pocket. Transparency would be nice... If the delivery companies save money, I would be annoyed having to donate to their surplus. Either I should get as much of my travel covered as possible, or there should be full transparency on why I get so little money per parcel." (Karen, 28).

As such, there are seemingly several balances that must be struck in the design and communication of a public transport based crowdshipping concept. The social aspect of the concept seemingly has potential to evoke positive feelings, but at the same time some fragility is seen in such non-economic motivations, as the positive associations risk being perceived as fake commercial extortion with a tint of 'greenwashing', if the concept and the organization around it is not perceived as transparent.

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