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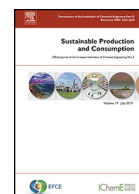
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## Research article

## User participation dilemmas in the circular economy: An empirical study of Scandinavia's largest peer-to-peer product sharing platform

Lei He<sup>a,\*</sup>, Liridona Sopjani<sup>b</sup>, Rafael Laurenti<sup>b</sup><sup>a</sup> Department of Earth Science, Uppsala University, Nyhemsgatan 34, 302 49 Halmstad, Uppsala, Sweden<sup>b</sup> Department of Machine Design, KTH Royal Institute of Technology, Stockholm, Sweden

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## ABSTRACT

Reusing material products via peer-to-peer (P2P) sharing is one of the circular economy (CE) strategies to fulfil consumer needs with minimised environmental impact and material consumption. However, adopting sharing practices challenges both societal normative behaviours as well as existing business models businesses. Previous studies grounded on stated answers about values, intentions and attitudes of users found several factors that impede the practice of sharing, even though users' needs were said to be satisfied. Nevertheless, few studies have looked at dilemmas that users face while engaging in sharing practices and how these inhibit their participation in CE solutions. This study addresses these discrepancies empirically in the context of P2P product sharing. Using a trust-ownership-need model, we investigated users' reviews (n=415) from an online P2P product sharing platform operating in Sweden and Norway. The data analysis method is a qualitative content analysis of the users' comments (from lessors or lessees). The results reveal the dilemmas that the platform users experience, i.e., information transparency, product pick-up and return arrangements, product quality, security, and user knowledge to operate the product. We argue that missing social presence in the virtual environment, low competence in sharing practice from lessees, and lax platform governance are contributing factors underlying the dilemmas. The research concludes with strategies for promoting user participation in sharing practice and optimising platforms to pursue CE's environmental promises.

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## 1. Introduction

Over-consumption of natural resources has been regarded as the foremost peril towards global sustainability (De Matteis, 2019; Durning, 1992; Gabriel and Lang, 2006; Levy and Burner, 1999). The urgency of transitioning towards sustainable consumption and the scarcity of concrete achievement to reach sustainability has been a topic in search for many years (Tukker and Tischner, 2006). The CE has recently been proposed to respond to the current unsustainable consumption patterns (Dumitru and Mira, 2016). Notably, the CE emphasises making the material flows of society more circular as in natural ecosystems, where material consumption is minimised, and resource use is prolonged (Blomsma and Brennan, 2017). However, many cultures consider material goods' consumption a prime method of acquiring happiness (Begg et al., 2005; Hirst and Reekie, 2013). Similarly, the modern economic

system has been striving to create unnecessary desires disguised as individual needs, detaching consumers from their well-being while exploiting the environment (Jackson, 2013). Therefore, CE's consumption approach challenges the relationship inhabiting conventional patterns between life quality and material consumption, meaning that the fore is no longer subject to the latter (Jackson, 2013).

Additionally, individuals in the CE are accountable for limiting their material consumption and changing their behaviours spontaneously (Brown and Cameron, 2000; IPCC SR1.5, 2019). Minimising resource consumption by intensifying the use of products whilst meeting consumer needs has become enabled through sharing practices, which allow consumers to use products for a fee and potentially support the transition towards CE. Consumers granting access to their private possession to other consumers mediated by the internet refers to reuse practices in the CE (Sopjani et al., 2019). The emergent phenomenon of 'sharing' comes from the fact that many products purchased and owned today have an idle capacity as they are not used all the time by the owners (Piscicelli et al., 2015). With ICT assistance, sharing practices have

\* Corresponding author.

E-mail addresses: [helei95@outlook.com](mailto:helei95@outlook.com) (L. He), [liridona@kth.se](mailto:liridona@kth.se) (L. Sopjani), [rafa@kth.se](mailto:rafa@kth.se) (R. Laurenti).

initiated an excellent tendency to form a circular material flow by putting existing resources to reuse, where material resources are reused multiple times by various individuals (Botsman and Rogers, 2010; Heinrichs, 2013; Vezzoli et al., 2015).

However, despite the growth of interest in developing innovative technological applications to support and enable sharing practices between strangers, there are considerable challenges to engaging end-consumers to participate and adopt such practices. Numerous studies have lifted critical factors that prevent successful deployment and use of shared-use products between users (Armstrong et al., 2015; Becker-Leifhold and Iran, 2018; Catulli, 2012; Schotman and Ludden, 2014). Camacho-Otero et al. (2018) found the factors preventing consumers from acquiring or participating in sharing practices: personal characteristics, product and service offering; knowledge and understanding, experience and social aspects, risks and uncertainty, benefits, as well as other psychological factors. Previous studies indicate that governments have not succeeded in minimising barriers due to the lack of comprehensive understanding of the concepts, consumers, and innovative social actors (Geng and Doberstein, 2008; Ma et al., 2018). Generally, studies are focused on small samples with limited access to sharing platforms data (Sopjani et al., 2020). These studies are often based on scenario-based future predicted use, stated preference surveys, or small-scale experimental setups of shared solutions. In many ways, the studies can fail to capture genuine problems that people face when engaging in the activity or practice of sharing products with others.

Hence, this study aimed to investigate sharing practices among users to identify present user dilemmas when engaging in such a form of consumption and explain dilemmas' potential causes. The study examined real-world data from the largest P2P product sharing platform in Scandinavia. The original data contains around 27,000 reviews from transactions of approximately 200 product categories. This study's main contribution is to increase understanding of influential factors shaping the experience around sharing practices between the users and platforms. The study is novel because it uses real-world data of user behaviour hence provides actors in the CE with knowledge of users, which can facilitate the design of prospective strategies to promote and increase social participation in the CE. Based on such research results, prospective strategies have been proposed to support actors in developing solutions.

## 2. Background

Sharing is fundamental consumer behaviour and a universal form of human economic behaviour (Belk, 2010). It is regarded as the act and process of distributing what is ours to others for their benefit or receiving or taking something from others for our benefit (Belk, 2007). Sharing tends to generate a connection with participants, which creates feelings of solitary and bonding (Belk, 2010). In the CE, the sharing practice is identified to increase the utilisation of existing material goods, skills, and valuable things via internet technologies (Stokes et al., 2014). Sharing practices include individuals exchanging, redistributing, renting, exchanging, and donating material or non-material objects such as information, goods, and talent by organising themselves or via commercial organisation by internet (Botsman, 2013; Heinrichs, 2013). From a CE's perspective, fostering sharing practices among individuals is crucial since it indicates an extension of product utilisation period, suggesting a slowdown of material cycling e.g. extending an existing product's life, which would include reusing, repairing, reconditioning, and technical upgrading or a combination of these (Bocken et al., 2016; Stahel, 1994). Reusing resources has been of particular interest conceptualised as 'slowing resource loop' through which products' utilisation phase is ex-

tended and/or intensified, potentially leading to a resource flow slowdown (Bocken et al., 2016) and waste reduction. The 'reuse' has been empirically supported in many studies as one of the most resource efficient strategies (Laurenti et al., 2016), meaning keeping value added to the material resources as long as possible. The business in a CE context tends to connect scattered individuals and their available resources through decentralised arrangements. In this way, it is possible to make better use of the resources that would be likely to stay idle as well as intangible personal skills or knowledge. Stokes et al. (2014) stated that the majority of activities in sharing practices bring in monetary transactions instead of equally and mutually beneficial exchanges. Three variations of reuse models have been suggested (Tukker, 2015): 1) consumers buying used goods from other consumers; 2) consumers donating used goods to other consumers; and 3) consumers using material products as a service based on access instead of ownership. In many ways, these are new and propose alternative models of consumption and business practices, which shifts the relationship between producers and consumers (Bardhi and Eckhardt, 2012).

User-related issues have emerged as one of the crucial aspects of facilitating the CE transition (Camacho-Otero et al., 2018) because users in the CE solutions have multiple roles. For example, the notions of user and consumer are tangled together toward a group of individuals who play a rather similar role in the buying decision of a conventional consumer market. Kotler and Keller (2016) defined a user as the person who uses the product or consumes the service and four other roles involved in the buying decision, i.e., initiator, influencer, decider, and buyer. Similarly, consumer refers to the end-user of a product or service (Doyle, 2016) as well as a purchaser of goods and services for the personal satisfaction of themselves or other members of their households, as distinct from use to generate additional income (Hashimzade et al., 2017). Nevertheless, neither of those approaches provide sufficient coverage of the role individuals play in the CE since one can profit from sharing things out as well as pay for taking things in. Besides, decision-making can be influenced by the contributions of the users themselves e.g. comments and ratings in platforms. In this context, a user can be defined as a generic term for someone who uses any form of interactive software, including webpages and videogames, concepts those from media and communication (Chandler and Munday, 2016). User-acceptance, including improving user participation and acceptance (Sopjani et al., 2019), are related, as many CE concepts are theoretically argued to require behavioural change (Schotman and Ludden, 2014). Users are required to have a leap in changing their habits and mindsets for the transition towards sharing practices (Catulli, 2012; Schotman and Ludden, 2014; Ye et al., 2019). From a user perspective, general literature suggests that sharing practices are dictated primarily by trust, ownership, and participants' needs (Catulli, 2012; Schotman and Ludden, 2014; Tukker and Tischner, 2006; Ye et al., 2019).

### 2.1. Users' trust

Studies support that trust plays a central role in shaping decisions for (re)participation in P2P consumption (Yang et al., 2015; Ye et al., 2019). Sharing practices on P2P sharing platforms require trust among users to initiate the practices and carry on the practices (Ye et al., 2019). Such processes consist of two forms of trust, swift trust and knowledge-based trust (Gefen and Straub, 2003). The fore is developed without previous experience prior to the trustor-trustee interaction; the latter is established during the interaction with exchange participants (Ye et al., 2019). Notably, on P2P online sharing platforms, the trust is divided into the trust in users and the trust in the platform (Traum, 2016), which are mutually interchangeable (Mittendorf, 2016; Tussyadiah and Pesonen, 2018; Ye et al., 2019). Some studies suggest that trust

is a driving factor for sharing practices because it is a foundational ingredient that facilitates human interaction and cooperation (Bardhi and Eckhardt, 2012; Belk, 2014; Sabitzer et al., 2018). It implies a general attitude of optimism that exchange participants are able and willing to carry out the claimed obligations (Schurr and Ozanne, 1985; Ye et al., 2019), which mediates the additional risks when users interact with strangers (Ye et al., 2019). Trust is also symbiotic with social presence, an attribute implanted where users interact with online P2P sharing platforms. The social presence estimates the extent to which an online sharing platform allows its users to experience the psychological presence from the other users whom they are facing in the sharing practice, and hence to perceive human contact, sociability, and sensitivity (Parker et al., 1978; Rice and Case, 1983; Ye et al., 2019). Social presence can affect trust by making users feel other users' presence and reducing the social distance users perceive (Hassanein et al., 2009; Lu et al., 2016; Pavlou et al., 2007). The trust on the P2P sharing platforms possesses multiple forms (swift trust and knowledge-based trust) and can be carried towards various actors (the trust in users and the trust in the platform) (Gefen et al., 2003; Traum, 2016; Ye et al., 2019). It can enhance connections between the platform and the users as well as relations among users (Bardhi and Eckhardt, 2012; Belk, 2014; Sabitzer et al., 2018). Besides, trust alleviates conflict, contributing to facilitating sharing practices (Sabitzer et al., 2018).

## 2.2. Users' sense of ownership

Even if trust is present, the sense of ownership is considered a highly relevant inhibiting factor of sharing practices (Bardhi and Eckhardt, 2012; Camacho-Otero et al., 2018). The appearance of ownership can lead to the increased valuation of an object, and such phenomena are named endowment effect (Park and Joyner Armstrong, 2019). It appears to be a greater valuation of sellers than that of buyers (Lin et al., 2006). Likewise, people assess a greater value to an object when they give it up rather than when they acquire it (Kahneman et al., 2011). There is a tendency that sellers would request more than they would pay if they were buyers (Dommer and Swaminathan, 2013; Park and Joyner Armstrong, 2019). Previous literature discloses that ownership of an object affects its attractiveness and raises its value to the owner (Morewedge et al., 2009; Park and Joyner Armstrong, 2019). Furthermore, ownership can also be interpreted as a self-referent cognitive bias owing to the possession of an object (Maddux et al., 2010). Maddux et al., (2010) suggested that the ownership of an object generates an association between the object and the self, as people possess intrinsic motivation to enhance their own selves; then the object-self association increases the valuation of the object. Such association appears to be the degree that people sense an object as their extended selves and the likelihood that people wish to retain the object (Belk, 1985; Kleine and Baker, 2004). Thus, the sense of ownership presents tension from owners' perspective in sharing practices on P2P sharing platforms, potentially directly influencing the ability and need to reuse already existing products. The CE necessitates hence a weakened connection between owners and their possession.

## 2.3. Users' needs

More obviously, a relevant essential factor is individuals' actual needs for reused material resources, e.g., shared products, which is not often discussed in CE literature, especially in societies, where such resources are already owned at mass. The perception of need is conventionally built on the preference of materialism, ownership, and attachment to possessions (Belk, 1985). To over-

come this culturally rooted preference, sharing practices need to be convenient, secure, and more cost-effective than private ownership for users (Botsman and Rogers, 2011; Piscicelli, 2016). Therefore, Piscicelli (2016) claimed that it is vital for adopting sharing practices to outperform the conventional consumption favouring private ownership and possession in satisfying the needs. Batty et al. (2015) identified cost, safety and security, comfort, information, frequency and reliability, speed or journey time as well as multimodality or ease of use, followed by order of importance, only when the fundamental needs are met will the advanced needs be considered (Maslow, 1943).

## 2.4. Summary

Based on this literature, trust, ownership, and needs form the basis of influential factors shaping the sharing practices, which would have a direct or indirect effect in the CE's implementation and success. These factors are interconnected, dictating users towards seeking sharing practices. For example, to facilitate successful sharing practices, four crucial principles are identified in the literature: critical mass, idling capacity, belief in the commons, and trust between strangers (Botsman and Rogers, 2010; Fishwick, 2004; Guyader and Piscicelli, 2019; Piscicelli, 2016).

Critical mass suggests the sufficient momentum that the consumption systems require to pledge a self-sustaining future (Fishwick, 2004). It is also famously known as the "tipping point" where the critical mass is achieved in the system. The content of critical mass varies from the form of consumption and depends on context, consumer needs, and expectations (Piscicelli, 2016). Achieving critical mass is fundamental to enable competition with conventional purchasing. It guarantees consumer satisfaction by the convenience and availability of the choices from shared consumption and provides social proof to evoke others to adopt such practices (Botsman and Rogers, 2010).

Idling capacity indicates the unused potential of tangible and intangible assets (i.e. physical products, time, skills, space, and commodities) when they are not in use (Botsman and Rogers, 2010; Piscicelli, 2016). Idling capacity can appear in cars, holiday houses, spare rooms, and potential skills (Botsman and Rogers, 2010). At the core, the question is how to unleash the idling capacity and redistribute the assets. For example, the development of internet technologies, social networks and GPS-equipped devices have made it possible to increase the product utilisation with affordable costs.

Belief in commons refers to the idea that the resources belong to all of us, such as air, water, and solar energy. It consists of four values underpinning shared consumption through reusing: collaboration, empowerment, openness, and humanness. Participants in such a system can generate value for other individuals while contributing to social value at a vast level (Botsman and Rogers, 2010; Piscicelli, 2016).

Finally, meaningful interaction and trust between strangers entail participants trusting whom the participants are not familiar with as well as the platform where the transaction takes place. To build such trust, platform providers apply various tools in transactions, i.e. rating system (hosts and guests can leave public reviews to each other), and identity verification system (Botsman and Rogers, 2010), online personal credit and identification (Piscicelli, 2016). However, research does not explicitly state how these are mediated by the platforms themselves and the potential dilemmas or perceived barriers that inhibit users while engaging in CE platforms. Hence, based on the literature, we constructed a model based on the trust-ownership-need understanding, through which user dilemmas were explored extensively using real-world data described further in the method section.

### 3. Method

#### 3.1. Dataset

In this study, data were obtained from the largest P2P stuff sharing platform with users based in Sweden and Norway (about 82,200 registered users at the time when the research was conducted). The platform operates with the concept of maximising product utilities. The model of sharing practices on this platform has been commonly applied by other actors, e.g., Airbnb for accommodation sharing (Traum, 2016), where the online platform is established for users to benefit from renting in and out products. However, this online stuff sharing platform does not limit its product categories into a particular type, offering an extensively wide range of product categories covering users' everyday needs, such as electronics, tools, and vehicles.

The database of the online stuff sharing platform was used as a dataset for analysis, which contained data from the start of the platform up to January 2019. Prior to accessing this dataset, the personal data was anonymised by the operator. Such a platform was chosen as a dataset because it is closely associated with P2P sharing practice, where individuals market their used products, and other users can book and use them. Besides, it offers a wide range of product categories that cover users' everyday needs. Furthermore, its model of sharing practices is commonly applied among other actors of sharing practices, e.g., accommodation sharing, Airbnb (Traum, 2016). Therefore, the dataset from the online stuff sharing platform was selected based on the rationale that it is common and revelatory (Phelan, 2011). The database access was granted by the owner of the online stuff sharing platform under the agreement as part of a collaborative research project, where all user data has been anonymised and protected under General Data Protection Regulation (GDPR-EU).

The database was accessed via software, PostgreSQL version 11. In PostgreSQL, a table of reviews was extracted by excluding reviews with blank comments. The database encloses reviews from users after finishing a sharing transaction. Each review contained two significant attributes: comment and rating. The comment varied from a couple of words to a paragraph, and the review was rated on a scale of 1 to 5. Due to the large dataset obtained containing all user behaviour in the platform, we narrowed the scope of analysis, limiting to one part of it, which is user transactions and reviews.

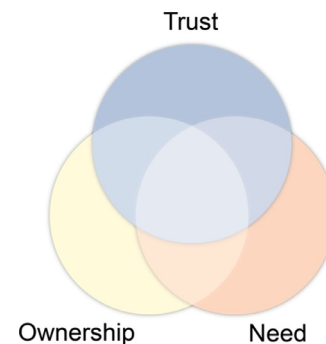
This original dataset was well-aligned with the scope and the objectives of this study because the quantified rating scale can serve as an indicator for the following process of selecting and screening comments. The number of reviews found in the dataset was 27,104. The analysis was focused on uncovering the knowledge in the textual comments. The sample number indicates the number of reviews. Therefore, there were users making multiple different reviews. The user demographics generating the original dataset is presented in Table 1 (Fig. 1).

The data selection aimed to create a small sample focusing on the reviews rated below five from the original dataset, for a five-rated review implied a satisfying experience, suggesting that few dilemmas emerged during the sharing practices. Therefore, non-five-rated reviews ( $n=415$ ) were then selected from the original dataset according to the ratings. 415 non-five-rated reviews were divided into 239 non-five-rated reviews from *lessees* and 176 non-five-rated reviews from *lessors*. Subsequently, as illustrated in Fig. 2, four groups of reviews proceeded to data analysis to develop three categories according to three influential factors proposed in the section Literature review. Details and approaches for coding and data analysis are presented in Section data analysis method.

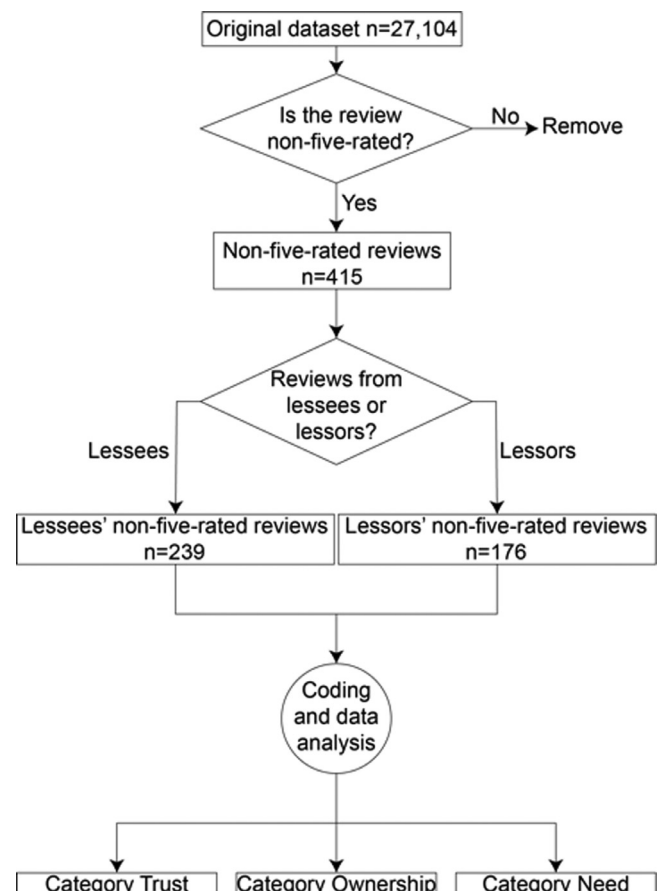
**Table 1**

User demographics from the dataset.

Demographic categories	Percentage
Age	
11–20	0,05 %
21–30	1,03 %
31–40	3,80 %
41–50	11,49 %
51–60	22,84 %
61–70	35,54 %
71–80	23,31 %
81–90	1,94 %
Country	
Sweden	33%
Norway	67%



**Fig. 1.** The trust-ownership-need model of factors affecting sharing practices.



**Fig. 2.** Data selection process.



**Table 2**  
Definitions of codes.

Codes	Definition
Trust	An arrangement enabling the property to be held by a user for the benefit of some other users (Law, 2016a). Trust can differentiate between the trust toward the platform and the individual user (Tussyadiah and Pesonen, 2018).
Ownership	The rights over property, including the right of possession, exclusive enjoyment, destruction (Law, 2016b). Besides, a relationship between the property leading to over evaluate one's property and consider the property as extended self (Kleine and Baker, 2004; Maddux et al., 2010; Park and Joyner Armstrong, 2019).
Needs	Something deemed necessary and supposed to be satisfied (Scott, 2015).

### 3.2. Data analysis method

Qualitative content analysis was used as a data analysis method. The reviews of lessees and lessors were analysed separately, to distinguish their different perspectives. The analysis consisted of two phases: open coding and axial coding (Ozanne et al., 1992).

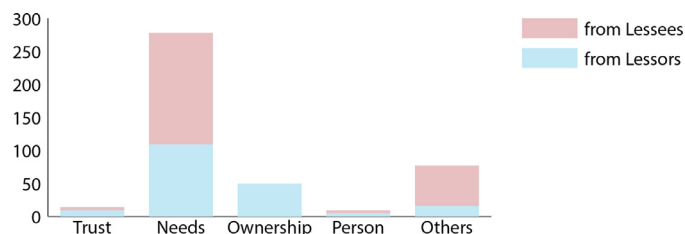
Firstly, open coding framed the phenomenon from the initial data where initial categories were formed (Ozanne et al., 1992). The reviews were classified based on the trust-ownership-need model constructed through literature review by determining the overall content in reviews. To ease analysis, clear definitions for each element of the model were developed (Table 2 below), which served as a classification and coding method for the content in reviews. Through this approach, research data based was categorised in each set; the aim was to uncover user dilemmas in relevance to these three elements in the model. We also explored the interaction between the dilemmas identified, e.g., if those were relevant to one, two, or all of the elements in the model; therefore, dilemmas are positioned in different intersections in the model.

Subsequently, axial coding, also known as theoretical coding, was conducted to link the categories developed through the open coding procedure (Robson, 2002). It generated an understanding of the central phenomenon under the dataset, including the condition that raised the phenomenon, the interaction of the phenomenon, and the consequences of the phenomenon (Ozanne et al., 1992; Robson, 2002). In each category, reviews were analysed and navigated by grounded theory to generate subcategories that emerged from the data, seeking a flexible data analysis and theory optimisation approach to this research (Charmaz, 2014; Knottnerus and Tugwell, 2010).

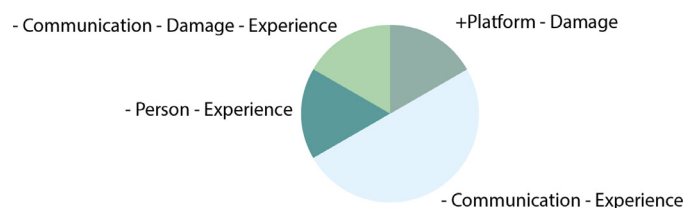
In this phase, the subcategories are generated through coding conducted in three steps: coding user comments, comparing the comments, and developing subcategories. To sort out a considerable amount of data, each comment was read, and critical features users emphasised in the comments were noted down correspondingly. According to the noted comments, the categories emerged through the comparison of the comments. All the coded comments were fitted into a table with different categories, where every coded review was assigned a row. In each row, categories and subcategories are indicated in the respective columns after the column of comments. Thereby, comments in different categories can be counted, which subsequently contributed to the visualisation and presentation of the composition in subcategories and categories. A workshop session with the platform owner was arranged to validate the findings and methodological approach. The method, the results, and the findings were presented and discussed in relation to their own experiences as founders of the platform.

## 4. Results

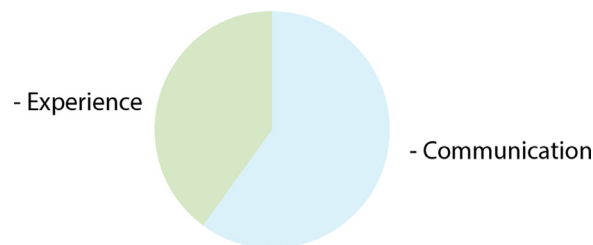
We present results from the open coding analysis where comments were categories based on the initial trust-ownership-need model. Each category consists of lessors' and lessees' reviews involving the related content, i.e., trust and needs. In contrast, it appears that it is relevant only for the lessors' reviews for category



**Fig. 3.** Factors related to trust based on the lessors' reviews.



**Fig. 4.** Factors related to trust based on the lessors' reviews.



**Fig. 5.** Factors related to trust based on the lessees' reviews.

ownership. Apart from that, some users addressed their opinions toward elements, i.e., manners, politeness, and respect; therefore, these reviews are categorised into emergent category named 'Person'. Besides, the category Others contains the reviews that present positive comments but are rated below five (Fig. 3).

### 4.1. Trust

The factors involved in trust-related reviews include negative and positive attitudes of users. In Figs. 4 and 5, the minus sign before the factor name represents users describing issues related to this factor as the main reason for the low rating of the transaction or experience. Similarly, the plus sign before the factor name represents users describing positive opinions for the satisfying transaction or experience.

Here we find that lessor users' negative experience because of unsatisfactory communication and damages caused to their products as well as personal attitudes towards the platform lead to low trust in sharing products. Also, we find that there is a complication of attitudes toward trust in one same review. Lessor users' trust can consist of positive factors and other negative factors simultaneously. For instance, the label "+Platform-Damage" in Fig. 4 signifies that the lessor's trust was positively affected by the platform, but

negatively affected by experiencing damage in the product. Worth pointing out here is the experience being affected by the interaction with the person, e.g., while coordinating the transaction such as picking the product and dropping it.

For lessees, similar patterns could be observed, whereby negative experience during sharing transaction and communication challenges led to affected trust towards the platform. However, from the lessees' point of view, the experience seems to be less affected compared to the lessors. An explanation for this could be that lessors have responsibility just like the platform to coordinate the transaction and manage the process of 'sale'.

According to the data analysis in axial coding, subcategories were discovered consisting of experience, person, communication, general trust, damage, platform, and the combinations among them. Experience influences both lessees' and lessors' perception of trust through its degree of satisfaction in sharing practice. Also, some lessees and lessors only commented on whether the user they contacted with was trustworthy and reliable or not. Additionally, communication plays a role in manipulating concerns of trust in sharing practice. Furthermore, lessees and lessors even commented that they felt trust without any rationale or justification in their comments. Distinctly, damage and platform were only stated in combination with other factors. Specifically, users demonstrated that trust concerning the experience during sharing was mostly affected by the following factors:

- Punctuality and Supportiveness of the users.
- Flexibility and Simplicity in the procedure of sharing practice.
- Functionality and Condition of the shared products.
- Reliability in payment.

#### 4.2. Ownership

Based on subcategories for the comments in category ownership, lessors related to the following subcategories comprising product handled, cleanness, communication, responsibility, honesty, and payment. Remarkably, lessees did not relate their reviews with the notion of ownership when they commented on their sharing practice. Therefore, the user group of lessees are not involved in this section. More than half of the lessor users are keen to relate to ownership based on the fact of how their products were handled during sharing practices. Especially, the cleanness of the products at the time of return influences the perception of ownership for a considerable portion of lessors. Likewise, a similar portion of lessors believed that the communication between their lessees during the sharing practice was essential to their sense of ownership. For example, lessors expressed their satisfaction with the sharing practices because they were well-informed of the situation of their possession via the clear communication between their lessees. Also, a small fragment of lessors considers responsibility, honesty, and lessees' personalities as the determinants of product ownership perceptions. Finally, lessors also considered that payment was essential to their sense of ownership being affected, including conducting payment as agreed before booking and having a clarified responsibility of payment for the cost of consumables between lessors and lessees.

#### 4.3. Need

The factors in the category need are distinguished between the perspectives of the lessors and lessees; simultaneously, these perspectives also share a couple of overlapping factors. Factors, arrangement time, product condition, product missing, product non-compatible, and payment, are all found in the comments among both user groups (lessors and lessees) of the platform in this section. In contrast, product non-functioning, product information,

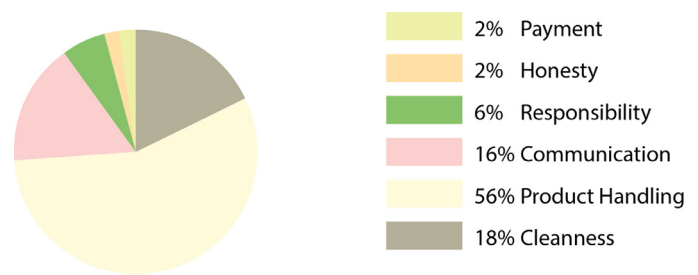


Fig. 6. Factors related to ownership based on the lessors' reviews.

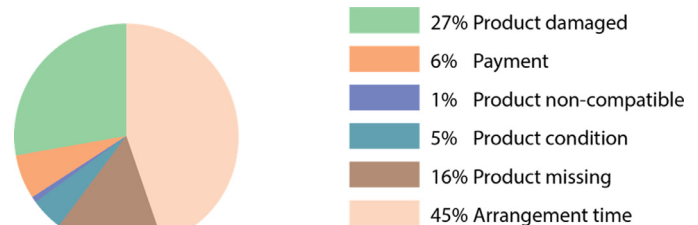


Fig. 7. Factors related to needs based on the lessors' reviews.

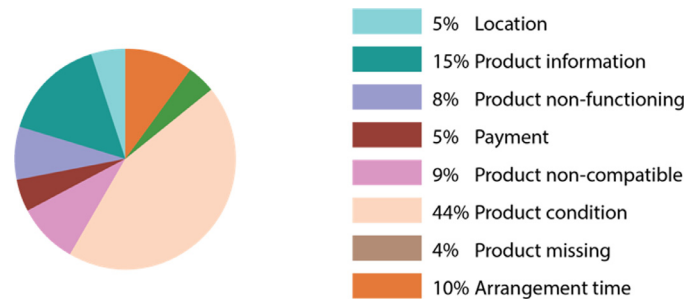


Fig. 8. Factors related to needs based on the lessees' reviews.

and location are only identified in the lessees' comments. Besides, a fraction of the lessors also commented on the factor product damage, which may be related to a similar phenomenon with product non-functioning in the lessees' comments (Figs. 6–9).

Additionally, a comparison bar chart is illustrated by listing the overlapping factors raised between the reviews from the lessors and the lessees, shown in Fig. 10. In comparison, lessors were primarily bothered by arrangement time and product missing, while lessees hardly suffered from the difficulties in those factors. On the contrary, most lessees were having challenges in product condition and the product being non-compatible during sharing practice, which did not affect lessees in sharing practice. However, factor payment influenced both the lessors and the lessees equally.

## 5. Discussion

This study aimed to investigate sharing practices among users (lessees and lessors) to identify present user dilemmas when engaging in such form of consumption and explain the potential causes of dilemmas. The study examined real-world data from the largest P2P product sharing platform in Scandinavia, and below, we discuss the main findings.

### 5.1. User dilemmas in sharing practices

The results suggest that user dilemmas are experienced for both types of users, affecting trust, sense of ownership, and need. Therefore, it is more sensible to present each user dilemma while relating to the model of trust-ownership-need. The study suggests

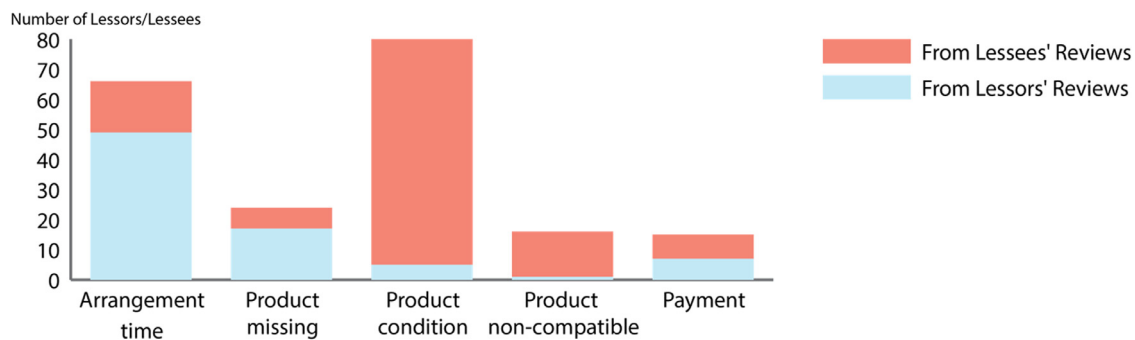


Fig. 9. Comparison of overlapping factors between the lessors and the lessees in the platform.

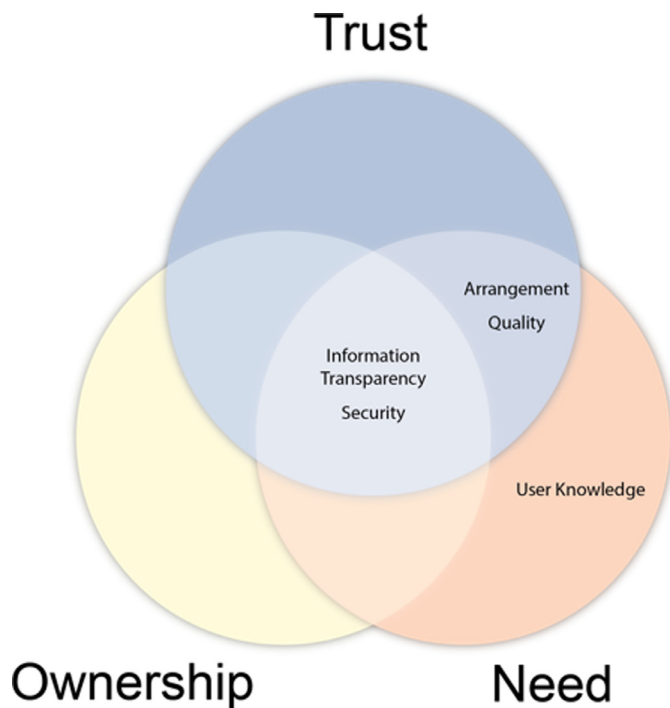


Fig. 10. Users' dilemmas in trust-ownership-need model.

five aspects where users face difficulties when engaging or participating in a sharing practice, i.e., *information transparency, arrangement, quality, security, and user knowledge*. Fig. 10 positions these aspects within the trust-ownership-need model proposed previously, showing how these are interrelated.

As illustrated in Fig. 10, *trust*, sense of *ownership*, and *need* are all affected by information transparency and security as crucial user dilemmas when engaging in sharing practices. Though trusts and needs are also further affected by arrangement and quality of products. Whereas, for need, there is another critical concern: the *user knowledge* about the product being shared as a critical dilemma. Below we explain each of these dilemmas and potential causes identified from the analysis.

Therefore, based on the involvement of different elements in the *trust-ownership-need model*, it can be simplified by excluding the empty sections, which better illustrates a hierarchical relationship among three elements, as shown in Fig. 11.

**Need** is a fundamental element involved in every user dilemma, which indicates that only when *needs* in sharing practices are satisfied can the dilemmas in *trust* and *ownership* be addressed. Similarly, dilemmas in *trust* must be addressed before successfully dealing with the dilemmas in *ownership*.

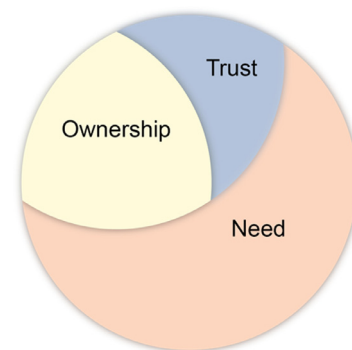


Fig. 11. Users' dilemmas in a simplified model of trust-ownership-need factors.

#### 5.1.1. Information transparency

Lack of information transparency was brought up in the comments from all three categories. The results illustrated that users craved for clear information or matched information in sharing practices. The comments from trust emphasise on the communication between lessees and lessors while engaging in sharing practices. The presence of communication leads to increased users' perception of trust toward other users. Such phenomenon is also evidenced in related research by (Ye et al., 2019) who claimed that a rich-content interaction reduced the perceived distance between lessor and lessees, thus improving online trust (Lu et al., 2016; Ye et al., 2019).

In the category **need**, users complained about experiencing hardship in receiving incorrect product information and incompatible products in sharing practices. To some extent, incorrect information resulted in receiving incompatible products. The fore includes not providing manual, insufficient instruction, and other forms of lack of information that resulted in requiring extra effort for the user during the sharing practices. The latter incorporates the wrong dimension of the shared products, unmatching plug and ports. This phenomenon harms the ease of use for users.

Consequently, it hinders sharing practices to fulfil users' needs and discourages users from engaging in sharing practices. As Batty et al. (2015) identified and explained the hierarchy of needs for public transportation, the ease of use or accessibility of the service is the fundamental need for other types of needs. In other words, it should be the most primary one among other needs to be satisfied. Likewise, the ease of use and accessibility was challenging in adopting sharing practices and can have a negative and positive influence on user willingness in taking part in sharing practices (Armstrong et al., 2015).

As for the comments from category **ownership**, users aspired to have consistent communication during sharing and clear payment responsibility. Consistent communication presents users with



information on how their product was handled, and if any accident happened to their products. Clear payment responsibility refers to which part of the cost should be taken by either side of the users. The lessors are reluctant to share their products when they perceive the loss of ownership. Becker-Leifhold and Iran (2018) described that ownership was related to a sense of control to the belongings, and the removal of it was a significant impediment to the adoption of sharing practices.

### 5.1.2. Arrangement

Out of the results from the comments such as the deficient arrangement during sharing practices was considerably concerning. Users mainly commented on time arrangement and location from the category **need** as well as experience from the category **trust**. In terms of needs, from an objective perspective, users were having difficulties in arranging time and locations for meeting and returning when they were engaging with the other user. Similarly, related research points out that time arrangement is influential in shaping sustainable lifestyles (Dumitru and Mira, 2016). Whereas, from a subjective perspective, in terms of **trust**, users perceived hassle in the experience of contacting the other user, including unpunctuality and inflexibility. However, an extensive range of research has demonstrated that the ease of use and accessibility were positively related to reducing the barriers in sharing practice (Armstrong et al., 2015; Tussyadiah and Pesonen, 2018). Likewise, Armstrong et al. (2015) claimed that users were concerned about waiting for an excessive period, even if the product satisfaction would be improved. Consequently, the users' perception of the ease of use and accessibility for sharing practices will be limited when they have troubles with arrangement and experience.

### 5.1.3. Quality

The defects in quality that users have experienced on the online stuff sharing platform involve comments from categories need and trust. These comments focus on product condition, product non-functioning, product damage, and experience. In the comments, users mainly complained that the needs were not met in their sharing practices because of the low quality of the product provided by both lessors and lessees. Comparably, satisfying products and processes are positively related to users' perceived trust. As attested by (Armstrong et al., 2015), the lack of guarantee of successful results reduces the perception of the ease of use, as a consequence, holds back users from participating in sharing practices. Moreover, in terms of the products, low quality is identified as one of the most significant reasons for dissatisfaction (Niinimäki and Hassi, 2011).

### 5.1.4. Security

Based on the results, comments demonstrating users' insecurity in sharing practices were found in all three categories: **trust**, **ownership**, and **need**. With the focus on product condition, product missing, payment, and platform, the result reveals users' concern for sharing practices in two areas: personal security and possession security.

The personal security was mainly related to the product condition underlying the risk of accident, e.g., conditions of cars, trailers, and other powered tools. This phenomenon can be explained as a particular trait among the users in Sweden or Scandinavia, as the linked research found that security and safety attracted more attention among individuals and institutions in Sweden than elsewhere (Nilsson, 2018; Schmidt et al., 2016).

The possession security was exposed to product missing and payment issues in the comments. These affect the accessibility of the products in sharing practices and therefore prevent the demand pyramid from establishing more advanced levels as accessibility lies at the fundamental level (Batty et al., 2015). As in order

of importance, only when the bottom is fulfilled can needs from more advanced levels be taken into consideration (Maslow, 1943). Similarly, the risk in payment will drastically reduce user acceptance when information asymmetry and unclarity are perceived (Yang et al., 2015). As a result, sharing practices are hindered.

Notably, the platform was found related to security according to the comments. The insurance policies mediated and compensated the risks of sharing practices based on some of the comments, but some comments also complained that the insurance did not provide satisfying coverage for their loss. Traum (2016) uncovered that traditional insurance was facing challenges to fit into the new business model of sharing products.

### 5.1.5. User knowledge

User knowledge embodies the comments from the category **need**, criticising product information, product non-compatible, and product damage. Explicitly, users desired information about accurate product information, how products are compatible with others, and the instructions of how users can adequately use the shared products. Lack of user knowledge in sharing practices relates to the user's perception of ease of use and accessibility toward this service. Therefore, it can hold back user participation in sharing practices (Armstrong et al., 2015; Catulli, 2012). Armstrong et al. (2015) rationalised that users were bothered by making wrong choices given the concerns over the technical requirements and skills as well as lacking a given form of customer service, such as help desk. From the users' perspective, sharing practices are in a dilemma in the absence of knowledge required for facilitating sharing practice.

## 5.2. Reasons causing users' dilemmas in sharing practices

### 5.2.1. Social presence

Social presence explains the phenomenon presented in the results that users commenting on trust and ownership are inclined to consider the communication and personal interaction during the sharing practice. Online P2P sharing platform faces the unique complexities in forming a trust, especially knowledge-based trust, due to the fact of internet involvement and lack of physical presence (Keymolen, 2013; Ye et al., 2019). An automated system facilitates the online platform with limited social interaction, i.e., body languages, emotional expressions, and human warmth. This limits users to judge other users' trustworthiness as in the conventional physical interaction (Gefen et al., 2003; Reichheld and Schefter, 2000). Besides, Botsman and Rogers (2011) accentuated that meaningful interaction and trust between strangers were principal elements for P2P sharing.

Moreover, another group of users complained that their needs were not met in sharing practices, including hassling arrangement between users, an extensive effort for facilitating sharing practice, and the uncertainty of product specifications. Such complaints reflect in two mediating ways: utilitarian engagement and hedonic engagement, when social presence relates to the trust of an online platform (Ye et al., 2019). The utilitarian engagement is brought down by the lean social presence in the studied case, resulting in decreasing the perception of ease of use and usefulness. As a consequence, users have problems in an arrangement, product, and other issues in practicality. In the same manner, poor hedonic engagement causes a low perception of social interaction due to inadequate social presence (Ye et al., 2019). Therefore, without sufficient social presence, people are reluctant to participate in and continue sharing practice, which impedes the development of sharing practice.

Hence, social presence merges as one of the reasons of previously stated users' dilemmas because users in this study blame the deficiency in ease of use or accessibility for sharing practice

and the interaction with the other user. The scarcity of social presence holds back utilitarian engagement and hedonic engagement through which trust can be cultivated.

### 5.2.2. Competence in sharing practices

The empirical results depicted that users were suffering from the dilemmas regarding the process of sharing practice. As demonstrated in Section 5.1, users lack the competences to communicate with clear but abundant information, make the right arrangement, and deliver quality products and service. Also, users have a varied knowledge of sharing practice and related products.

According to practice theory and Material-Competence-Meaning model (Shove et al., 2012), it is observable in the data that lack of competences exists in the studied sharing practice, causing a weak linkage among competence and the rest elements. Therefore, competence is lacking in this sharing practice overall. Sharing practice requires plenty of underlying competencies, e.g., understanding the given products, communication with the lessors and lessees, and time management. Even as a platform, it is responsible for being capable of securing the sharing practice and providing its users with the perception of security.

Data shows that dilemmas are in the different places of the spectrum between the individual barrier and social/institutional barrier. Hence, the scarcity of competence involves both users and the platform as the sharing practice carriers. User knowledge mainly entails input from users, and security primarily demands the platform's effort while the secondary responsibility of users is necessary. The lack of competence in information transparency, arrangement, and quality necessitates the joint commitment from users and platform. The existing deficiency in the competence of sharing practice hurdles the meaning and value to be interpreted into practice, meanwhile preventing the materials and products from being delivered efficiently (Piscicelli, 2016; Shove et al., 2012). Enhancing competence in sharing practice has the potential to improve the perceived ease of use, accessibility, and even social presence.

### 5.2.3. Platform responsibility

As mentioned above, the platform is accountable for facilitating the sharing practices, specifically online stuff sharing practice in this thesis. In terms of user dilemmas, the platform is responsible for the majority of them. The platform acts as an intermediary between lessees and lessors, therefore playing a vital role for facilitating sharing practice (Han et al., 2016; Lee et al., 2018; Mittendorf, 2016; Ye et al., 2019). The trust in a platform from its users determines users' intention, behaviour, and participation (Lee et al., 2018). It can even be transferable and correlated to the trust in other users (Mittendorf, 2016). Therefore, it is crucial for the platform to maintain the trust between users, as it completes the scarcity of knowledge-based trust and social presence the sharing process (Gefen et al., 2003; Ye et al., 2019).

The platform can also affect the sharing practice by providing methods to mediate the underlying risks causing users' dilemmas, for instance, insurance. The results reveal that insurance and compensation were primarily two concerns when users related their comments to the platform. The platform was commented positively when the user received sufficient compensation. In some particular cases, the user even expressed gratitude to the platform when the described situation could have ended in a low rating. On the contrary, the platform was blamed for not providing compensation as it was supposed to. Both lessees and lessors are required to have a giant leap of their trust to believe that the product has not been abused (Catulli, 2012). The lessees need to trust the quality of the shared product, and the lessors need to believe that the ownership of the product is maintained during sharing practices.

In such cases, insurance and compensation from the platform offer a solution at an institutional level to reduce the perceived risks and actual risks (Vezzoli et al., 2015), therefore promoting anticipation of sharing practice.

## 6. Conclusion

The transition to sustainable consumption behaviour is not a simple task for individuals in any circumstances. Educating individuals and optimising systems play an essential role in solving dilemmas and improving user participation in the CE through P2P sharing. This study examined a dataset containing ratings and comments from lessors and lessees of a P2P sharing platform operating in Sweden and Norway. Following a theoretical framework, a series of influential factors were structured into a trust-ownership-need model. The results showed the concerns and difficulties that users are experiencing regarding the practice of sharing products mediated by the platform. We found that information transparency, arrangement, quality, security, and user knowledge are the major ones. Users' dilemmas are also presented concerning the trust-ownership-need model. Social presence, competence in sharing practices, and platform responsibility are key areas needing enhancement for resolving dilemmas and improving user participation. According to those factors, the initial model was modified to represent that a hierarchy between trust, ownership and need exists and affects user participation in P2P product sharing.

This research also achieved unintended findings, revealing the question of whether the CE adaptation is achieved in practice as it intends conceptually. As many cases in the result of this research suggested, products can be damaged during the lease; in these cases, the product lifetime is shortened, contradicting the CE's conceptual purpose regarding product lifetime extension. Some cases also presented that sharing practices can be a profitable business for lessors fuelling additional new products to the platform. In this way, sharing practices may become a business-as-usual model under the conceptual cover of the CE. It is a salient area needing further consideration to empirically investigate whether the resource reduction outcomes from sharing practices in the CE are attained as expected conceptually.

There are, however, limitations to this study. The major body of data analysed in this study is textual comments written by users. Such self-reported data naturally possesses limited objectivity. Also, it is challenging to identify and avoid exaggeration and omitting details in the data. The study attempts to mediate the impact of this limitation by identifying the patterns disregarding their extents. Further, this study utilises the data from an operator present only in the Scandinavian region. The generalisability of the study is hence subjected to its context.

Future research could focus on the following directions: experimenting with website content and users' reaction; an analysis of environmental resource required during CE as well as the comparison with the conventional forms of consumption; investigation about if peer-to-peer CE has become a profitable rental business under the cover of CE, and how CE reduces resource input in reality, rental business or new form of consumption.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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