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The measurement of the economic, social and environmental impact of Peer to Peer online platforms: The case of collaborative consumption¹

La medición del impacto económico, social y medioambiental de las plataformas online entre iguales. El caso del consumo colaborativo²

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ABSTRACT

Over the last decade, the rise of peer-to-peer online markets has become a major sociocultural and economic phenomena and been described as a collaborative or sharing economy. However, understanding their impact has been mired in controversy and disagreement. Proponents of the sharing economy hail its potential to be a panacea for many of the world's problems, but more critical perspectives point to research that undermines these claims. The rapid growth of this type of activity has placed public administrators in particular under pressure to develop appropriate policy and regulation. However, policy development is severely hindered by a lack of data and suitable measurement techniques. Work to develop appropriate data measurement tends to focus on economic measurement at the expense of social and environmental impact. This research paper seeks to contribute to understanding this problem area by taking a comprehensive triple impact perspective (economic, social and environmental) of the object of study. Employing a Delphi technique, the research developed forty-seven impact indicators across the three areas of measurement.

KEY WORDS

Delphi study; digital technology; impact indicators; platform economy; sharing economy.

RESUMEN

A lo largo de la última década, el crecimiento de las plataformas de intercambio entre iguales, descritas como economía colaborativa, representó un de los fenómenos económicos y socio-culturales más importantes. Los defensores de la economía colaborativa resaltan su potencial para convertirse en la panacea de los grandes problemas mundiales, mientras que las perspectivas críticas apuntan a investigaciones que contradicen estas ideas. El rápido crecimiento de este tipo de actividad ha puesto a la administración pública bajo la presión de tener que desarrollar medidas de regulación adecuadas. Sin embargo, el desarrollo de regulación en este sentido adolece gravemente de la falta de datos y de técnicas adecuadas para medir el impacto. Los intentos por medir este impacto están por lo general concentrados en producir indicadores económicos, a expensas de la medición del impacto social y medioambiental. Esta investigación trata de contribuir a esta cuestión desde una perspectiva holística que estudia el triple impacto (económico, social y medioambiental) de este objeto de estudio. Recurriendo a un estudio Delphi esta investigación ha desarrollado 47 indicadores de impacto en estas tres áreas de medición.

PALABRAS CLAVE

Estudio Delphi; economía de plataformas; indicadores de impacto; sharing economy; tecnologías digitales.

1. INTRODUCCIÓN

Predicated on a change in consumption patterns towards one in which digital technologies create economies of scale that allow peers to take advantage of systematic overcapacity in consumer products (Gil, 2018; Benkler, 2004), the collaborative and sharing economy—more recently also referred to as the platform economy (Schmidt, 2017) or platform capitalism (Morozov, 2019; Srnicek, 2016; Vallas, 2019)—is undeniably one of the major socio-cultural and economic phenomena of the 21st century (Bulchand & Melian, 2018; TNS, 2016; Huws & Joyce, 2016). With industry revenues of nearly €4.5bn and transaction turnover of €28bn in Europe alone (DeGroen, 2017), multi-billion dollar platforms, like Airbnb and Uber, have dominated the news (Hook, 2017; MartínezDíez, 2019), while many other not-for-profit platforms operate for altruistic and community-based reasons, mostly at the local level.

While there is little debate that economic recession, environmental meltdown, and social inequality are related to the emergence of the sharing economy, there is no agreement about its impact on society and how it should be addressed by public policy (Riso, 2020). Debate on the sharing economy has focused on its social, economic and environmental implications (de Rivera & Gordo, in-print; Pargman, Erikson & Friday, 2016; Martin, 2016). Platforms and other proponents advocate for it as a paradigmatic shift to sustainable economies and societies, where citizens are empowered, society is fairer, resources are consumed more efficiently, markets are dynamic and people save money (Botsman & Rogers, 2010; Stokes et al., 2014; OuiShare, 2015).

However, an OECD (2016) report highlighted the many downsides to the contingent type work available in collaborative consumption (Rogers, 2016). Findings by Demary (2015) and Schor et al. (2016) contradict the supposed social benefits of connectedness and fairness of both for-profit and not-for-profit organizations. Similarly, criticisms have been raised regarding the supposed emergence of environmentally sustainable consumption practices (Demailly & Novel, 2014; Frenken & Schor, 2019; Dreyer et al 2017; Murillo, Buckland & Val, 2017).

Throughout these debates, public administrators, market regulators, law-makers and consumer organizations have been left scrambling to provide adequate policy responses to resolve the on-going conflict and the new challenges of supporting enterprise while protecting consumers and workers (Fernández-Trujillo, 2020; Rani & Furrer, 2019). In addition, recent studies have shown the complexity of measuring the impact of specific platforms, such as Airbnb and Uber, on their competitors in the traditional economy (Dogru et al., 2020;

Skok & Baker, 2019). Most notable, however, is that the majority of the efforts to measure the sharing economy and its impacts conducted to date have focused almost exclusively on economics and the labour force (Fernández-Macías, 2017; Riso, 2020), while social and environmental issues, two important dimensions of the collaborative economy proposition, have been largely ignored (Parguel, Lunardo & Benoit-Moreau, 2017; Schor, 2014).

In this context, national consumer organisations from four European countries —Organización de Consumidores y Usuarios [OCU] (Spain), Test Achats / Test Ankoop (Belgium), Altroconsumo (Italy) and Deco Proteste (Portugal)—commissioned an ambitious research project whose overall aim was to account for the impact of collaborative consumption platforms in society. This study was published under the title «Collaboration or Business? Collaborative Consumption: From Value to Users to Society with Values» (OCU, 2016). The research presented here was a central part of this project. Its aim was to identify appropriate social, economic and environmental indicators to measure the impact of online peer-to-peer collaborative consumption platforms. To do this, we employed a three-round Delphi technique with thirty-two experts and stakeholders. Despite the five years that have passed since we started the fieldwork, to date, this is still one of the few studies that provides independent and rigorous analysis of the impacts of peer-to-peer exchange platforms on society.

2. CONCEPTUAL OVERVIEW

The sharing economy has been promoted as an innovative and disruptive economic model and “a major commercial opportunity for entrepreneurs, companies, industries and/or countries” (Martin, 2016: 153). This growing phenomenon around the world brings with it an economic model characterized by reallocating the idle capacity of goods and services, such as car seats or living spaces, through secondary markets and sharing using web-based information and communication technologies (Benkler, 2004; Mair & Reischauer, 2016). A particularly prominent and controversial subset of the sharing economy consists of “collaborative consumption” (CC) business models, which, as Dreyer et al. (2017: 87) note, “emphasize the commercial aspects of sharing” and involve coordinating “the acquisition and distribution of a resource for a fee or other compensation” (Belk, 2014: 1597).

There is significant ambivalence surrounding the turn to a sharing economic model (Acquier et al., 2017; Martin, 2016). Authors such as Allen and Berg (2014) argue that collaborative consumption represents a necessary adjustment to over regulated and over protected markets, and Coyle states that the result is “pure gain in economic efficiency benefiting both sides” (2016: 8). The evidence seems clear that it has stimulated competition and had a deflationary effect on prices in sectors such as accommodation and transport (Laurell & Sandström, 2017; Zervas, Proserpio & Byers, 2017). But, is such competition

fair and to what degree does it depend on informal labour relations, lack of regulation and tax avoidance?

The arguments against platform labour focus on flexibilisation, whereby economic risk and liability are unequally shared, while “control criteria” are still applied to working conditions (OECD, 2016; Eglash, 2016; Rogers, 2016). Platforms are viewed as contributing to employment precariousness by privatising risk, which leaves prosumers, or providers, with little protection in terms of health and social security (Fernández-Trujillo, 2020; OECD, 2016). These downsides of the sharing economy in the labour market have been confirmed by various reports from the European Commission (2016; 2017), the European Parliament (2017) and more recently by the International Labour Organisation (ILO, 2018). Given that most platform workers do not earn all or most of their income online (DeGroen & Maselli, 2016), that they generally participate reluctantly and for short periods of time, the use of terms like ‘entrepreneur’ to describe them is misleading, particularly as they do not receive the typical financial benefits of entrepreneurship as a trade off for a loss of social security (Rani & Furrer, 2019). Finally, although platforms claim to be about individual prosumers, research on Airbnb, for example, shows that many corporations also operate on the platform (Cox & Slee, 2016).

The sharing economy is considered to blur the boundaries between production and consumption, the social and the economic. Meeting new persons, authenticity and developing new friendships are some of the outcomes of peer to peer exchanges between strangers (Belk, 2014). Platforms discursively frame their activities within these narratives of sharing, collaboration and connection (Wagner et al., 2015), presented as ideological counter offerings to the isolation and separation of traditional marketplaces (Richardson, 2015). Furthermore, technologically driven reputation systems have been touted as meritocratic social assets (social currency) that make self-regulation possible through crowd-sourced information on provider and consumer performance by reducing information asymmetry (Arroyo, Murillo & Val, 2017). In this sense, the way trust is gained and managed in the collaborative economy is identified by its advocates as a key advantage of the model (Botsman, 2017).

Other studies have found that technology may actually impede or weaken social relationships in collaborative consumption contexts (Schor, 2014; Parigi & State, 2014). While some authors have focused on the way the sharing economy may prompt the monetization of social relations or social capital (Teubner, Hawlitschek & Dan, 2017). Additionally, Edelman and Luca (2014) found that race based discrimination is reproduced. The work by Schor et al. (2016) on not-for-profit exchange and digital platforms, shows how participants use cultural capital to “establish superior position in the context of various types of exchanges” (p. 66) Furthermore, evidence suggests that the self-regulatory function of reputation and rating systems are not reliable and easily manipulated (Codagnone, Biagi & Adabie, 2016).

Turning to the environmental impacts of the sharing economy, promoters champion its capacity to be a driver of a sustainable economic system with a re-

duced carbon footprint (Botsman & Rogers, 2010; Torregrossa, 2013; Heinrichs, 2013). However, Schor (2014) argues that these claims have become truisms, based more on assumptions than hard evidence, while “the actual environmental impacts of the sites are far more complicated”. In this respect, Frenken & Schor (2019) make a good point both in terms of the lack of data and the complexity of the issue, while also pointing out the importance of distinguishing between different kind of practices that have been wrongly defined as part of the “sharing economy”, in order to account for their environmental impact.

In terms of the complicated nature of measuring the environmental impact, it is overly simplistic to assume that the sharing economy is a type of voluntary correction to a socio-economic model that is living beyond its means (Pargman et al., 2016). It is necessary to consider a whole series of first and second order effects on a holistic basis (Börjesson-Rivera et al., 2014). Cohen (2016) draws attention to the prevalence of the Jevons Paradox, which refers to how technological developments resulting in increased efficiency can perversely drive up consumption. In the sharing economy, a number of studies have demonstrated this ‘rebound’ effect, which drives up consumption and reduces sustainability in accommodation and transport (Schröder et al., 2019; Verboven & Vanherck, 2016; Frenken, 2017). Pargman et al. (2016) conclude that it will only be environmentally sustainable when a limits based approach is taken that restricts overall structural unsustainability, or what Cohen (2016) refers to as sufficiency instead of efficiency. Finally, it is also necessary to consider the wide range of sectors of activity in which collaborative consumption operates, as we have discussed elsewhere (Gordo, de Rivera & Cassidy, 2015; de Rivera, 2019).

Thus, there is significant uncertainty surrounding the value impacts of collaborative consumption as one of the most important subsets of the sharing economy and, in more general terms, the online platform economy. However, to understand the impacts of collaborative consumption requires constructing a framework based on objective and measurable indicators. The following section describes the research methodology we used to such an end.

3. METHODOLOGY

The main objective of the independent international research framework this paper draws on was the development of indicators to assess collaborative consumption platforms in terms of their economic, social and environmental impacts. As we have noted above, collaborative consumption has been fuelled by its association with economic benefits for both consumers and providers. In addition, the sharing economy has been associated with the idea of fostering a more circular and sustainable economic model as mentioned earlier. Finally, it is also claimed to provide social benefits, in the sense of facilitating more meaningful contacts (*bonding*) and increased social mixing (*bridging*) (Dillahunt & Malone, 2015).

After an extensive literature review of previously published documentation to identify the main debates on the issue, the Delphi research described here was aimed at identifying measurable dimensions and concrete impact indicators to evaluate the impact of collaborative consumption. These indicators were then used to develop an evaluation tool to measure the economic, social and environmental impact of peer-to-peer collaborative consumption platforms: *The Triple Impact Assessment Questionnaire*. In this research strategy, other methodologies were also applied, such as netnographic research aimed at examining the complexities of platforms' social impacts (de Rivera et al, 2016).

The Delphi study was a crucial phase of the overall research because it was used to conceptualize the issue, while avoiding oversimplification and baseless assumptions. This methodology, based on systematically consulting groups of experts through a questionnaire, has long been applied to address complex issues (Linstone & Turoff, 2002). Therefore, its use was highly indicated to address the study of an object as broad and wide-ranging as the impact of the collaborative economy, where knowledge has not yet been formalised into accepted arguments and structures.

An effective Delphi study requires qualified experts who have an in-depth understanding of the subject (Rowe & Wright, 2001). Following Okoli & Pawlowski's (2004) approach for expert selection, and with the aid of previous documentary analysis, we identified a list of international experts (or stakeholders), grouped by their expertise and background in economic, social and environmental issues related to the collaborative economy. This grouping rationale and the multi-panel design of the Delphi study was based on developing precise measurement indicators for each of the areas of impact, as required by the demand context.

We invited ninety-eight experts to participate, of whom thirty-two accepted. The expert panel was made up of representatives of CC platforms (11 – 34.4%), followed by consultants/think-tank members (9 – 28%), public administrators (4 – 12%), CC researchers (4 – 13%) and consumer organization CC experts (3 – 9%). Regarding geographic distribution, the experts were drawn from eight countries, with a noticeable bias toward Spain (16-50.0%). In terms of distribution by expertise, the experts were directly asked to state their area of expertise in order to confirm our previous grouping: thirteen identified themselves as economic experts, twelve as social experts and six as experts in the environmental dimension of CC.

Table 1. Response rates. Source: By authors

	No of Experts	Response rate	Economic Experts	Environmental Experts	Social Experts
Round 1	32		13	6	12
Round 2	29	90.6%	13	6	10

Round 3	25	78.1%	12	4	9
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The success of a Delphi process depends on the commitment and continued participation of experts until the process is completed, and can be susceptible to significant attrition after the first round (Linstone & Turrof, 2002; Keeney, Hasson & Mckenna, 2011). In this study, we employed three iterations or rounds, which were preceded by a pilot testing phase with an Advisory Group³. The fieldwork took place between February 2015 and May 2015. Table 1 outlines the round by round response rates for this study, which at 90.6% for Round 2 and 78.1% for Round 3 are acceptable when compared to other studies (Keeney, Hasson & Mckenna, 2006). However, the reduced number of experts in the environmental panel was obviously a methodological limitation we had to face, as will be discussed later.

Prior to the implementation of the first round, an online questionnaire was developed and piloted with the Advisory Group and changes were made based on their feedback. The questionnaire for the first round began with three open-ended questions; all panellists were asked to propose several economic, social and environmental impact indicators, along with their reasoning. Subsequently, they were presented with approximately twenty indicators for each dimension and asked to choose ten and rank them on the basis of their relevance and measurability. This “seed-list” of indicators (Schmidt et al., 2001) was developed based on the results of desk research and reviewed by the Advisory Group.

Following data collection, open-ended responses were analysed through a process of progressive categorization and coding until theme areas emerged, while the closed-end ranking of the seed-list items was statistically analysed. The final output was a consolidated list of items, including improved items from the closed-end analysis and new items from the open-ended analysis. In the second round, experts were asked to identify and rank the seven items they thought were most important in the consolidated list of indicators. Through this ranking process, key indicators were identified and experts had the opportunity to comment on their rankings or individual indicators.

Based on the main ideas and feedback from rounds 1 and 2, the researchers worked to develop more “measurable” indicators for round 3. In the final round, the experts were divided into three panels, according to their own area of expertise (economic, environmental or social), each receiving a questionnaire with a different list of indicators. In each panel, the questionnaires included the results from Round 2, including the overall score (from all panellists) and the scores from the group of experts in their own field of expertise. Then, the experts had

³ Made up of the coordinator, members of the four consumer associations and collaborative economy think-tank experts (Ouishare) and a researcher from ICADE University, Madrid

to rate the importance of each item on a 5-point Likert scale (from not at all important to very important).

Finally, we have to point out that the broad scope of the research suffers certain methodological limitations to be addressed in further research. First, the expert/stakeholder group has a significant bias toward Spain (50%) and Europe (87.5%). Second, given the exploratory nature of this research, the indicators produced were not always realistic in terms of measurability, as we found out later in the platform survey we conducted as part of the broader research program, in which most platforms offered considerable resistance to divulging certain information, even on a confidential basis (OCU, 2016). Third, the multi-panel strategy implied a reduced n in round 3, especially on the environmental panel. For the development of rounds 1 and 2, this had little impact as all experts participated; however, as the third multi-panel round was only completed by four of the six environmental experts, it presents some difficulties in the ratings of the indicators, and this caused problems with absolute response numbers in the last round. Nevertheless, we think that the responses from previous rounds provide enough valuable data to justify the presentation of the results. Alternative research designs may be used to model the environmental impact dimension in more detail, and should include a sufficient number of experts.

4. RESULTS

The results of the final round (tables 2, 3 and 4) are presented separately for each of the three impact areas (social, economic and environmental). There are a total of 47 indicators organized in nine sub-dimensions (three in each main impact area). These items were developed from the results of the second round, and were rephrased in order to generate a list of items that could be measured. The Round 3 results are ordered according to the mean importance (rated on a 5-point Likert scale) awarded by the experts. Indicators that scored below 3.00 were eliminated --only two in the social dimension and one in the environmental dimension. In the case of two or more indicators receiving the same importance score, we used the standard deviation (SD) as a secondary measure of rank. The interpretation of the results are illustrated with quotations from the experts' comments in the Round 1 open-ended section.

4.1 Economic impact indicators

The list presented below is based on the analysis of expert panellists in their own field (in this case the economic impact of the sharing economy) in the third and final round. It consists of thirteen indicators (table 2) organized into three sub-dimensions: a) *prosumer empowerment*, b) *consumer empowerment*, and c)

macro level *economic stimulation*. The economic impact indicators are identified as EC1, EC2, etc.

The **prosumer empowerment** sub-dimension looks at how collaborative consumption empowers ‘new’ economic actors, as prosumers, to generate wealth by taking advantage of idle resources of goods, services and people. Its importance is evident in the fact that three of the top five indicators are related to this sub-dimension. The key role of the monetization of idle capacity (indicator EC4, ranked 2nd) for this sub-dimension is illustrated by Expert 13 when noting that *peer-to-peer marketplaces offer many opportunities for generating additional income from idle assets, for instance by renting out a room, an apartment, a car, or by delivering services via task sharing platforms*. Similarly, EC6 measures “the average amount of money earned per user on the platform”, rated as ‘important or very important’ by 58.4% of experts. However, the fact that the remaining experts scored this indicator between 2 and 3 may reflect some scepticism about income as a measure of impact. As Expert 1 states: *they [prosumers] can easily see monetary revenue (if there is any) but it is interesting to compare this revenue with the different costs (e.g. labour, inputs, health)*. Expert 20 also relates this issue to labour precariousness, asking if gains are made or if secure labour is *being substituted with poorer paid, unskilled low-quality labour at lower cost?*

The **consumer empowerment** sub-dimension refers to consumption advantages accrued in terms of pricing, choice and access. Only one ‘consumer empowerment’ indicator was ranked in the top half of the list. However, this indicator (EC2, ranked 1st), defined here as “average savings to users by participating in CC” was ranked highest of all and relates to one of the predominant themes of CC. This would appear to relate to the utilitarian motives behind many users engagement in CC (to increase purchasing power). As Expert 13 states, *most peer-to-peer marketplaces enable their users to save money on goods and services they usually spend their household income on, for example, by renting a car when needed rather than owning one*. However, it is notable that 25% of the experts rated this indicator as 2 or 3 out of 5, indicating some level of disagreement, which, as Expert 1 says, may relate to the *real cost of [...] consumption (e.g. time to search for information, compare providers and access the product)*. The three remaining consumer empowerment indicators (EC7, EC8, EC9) received scores predominantly in the range of 3 to 4, giving them a low-to-middle rank in the list.

The **economic stimulation** sub-dimension examines impact on the local economy and total spending. It contains three indicators rated as having high, middle and low importance. The impact of CC on the local economy indicator (EC1, ranked 3rd), with 66.6% of experts rating it as ‘important or very important’ to measure “the average revenue made by users, from the same location/ city/region”. Linked to prosumer empowerment and employment, Expert 5 stated that *it is very important to evaluate how [prosumers’] income contributes*

to the stimulation of local business and local products and services [...]. In this respect, there is some concern about the dynamics of the CC marketplace having a negative impact on local economies. As Expert 6 asked: Who wins? Platforms could shift profits from local to global market players [...] Money (and tax revenue) could move from the local market to global platforms. Instead of being more resilient on a local level, sharing could make you lose all autonomy. For its part the “average amount of money spent per consumer on the platform” (EC5, ranked 6th) was rated negatively by two experts. Finally, the “platform contribution to taxes” in the country of operation (EC13, ranked 13th) was the lowest rated indicator.

Table 2. Round 3 Results: Sub-dimensions and indicators of the ECONOMIC impact dimension. Source: By authors

Category	Item description	Rank	Mean	Std. Dev.	Importance score (1 = very unimportant, 5 = very important)				
					1	2	3	4	5
Consumer empowerment	EC2. The average savings users make by participating in CC.	1	4.25	1.06	0.0%	8.3%	16.7%	16.7%	58.3%
Prosumer empowerment	EC4. The average extra earnings that users make over a year by sharing the idle capacity of their products/services.	2	4.00	1.28	8.3%	0.0%	25.0%	16.7%	50.0%
Economic stimulation	EC1. The average revenue made by users, from the same location/city/region, through transactions/exchanges over the last year.	3	3.92	1.00	0.0%	8.3%	25.0%	33.3%	33.3%
Prosumer empowerment	EC12. Percentage of total revenue made by the users according to their reputation rating.	4	3.83	0.84	0.0%	8.3%	16.7%	58.3%	16.7%
Prosumer empowerment	EC6. The average amount of money earned per user on a platform.	5	3.67	0.89	0.0%	8.3%	33.3%	41.7%	16.7%
Economic stimulation	EC5. The average amount of money spent per consumer on platforms.	6	3.58	1.08	0.0%	16.7%	33.3%	25.0%	25.0%
Consumer empowerment	EC9. The percentage of users that are companies, whether offering services or looking for them (i.e. when businesses act as peers in the same way and under the same conditions as other users).	7	3.50	0.91	0.0%	16.7%	25.0%	50.0%	8.3%

Consumer empowerment	EC7. The percentage of products-services offered that would not be available in the regular (or first-hand) commercial market (i.e. antiques, rarities, places for rent etc.).	8	3.42	1.00	0.0%	16.7%	41.7%	25.0%	16.7%
Consumer empowerment	EC8. The number of different kinds of transactions facilitated by platforms over the last year (Selling; Giving or donating goods, services or time; Renting/leasing; Lending; etc.).	9	3.42	1.00	0.0%	25.0%	16.7%	50.0%	8.3%
Prosumer empowerment	EC10. The percentage of providers as a proportion of all users/consumers.	10	3.42	1.00	0.0%	16.7%	41.7%	25.0%	16.7%
Prosumer empowerment	EC11. The proportion of all revenue earned by the top 20% of earners/users.	11	3.33	1.16	8.3%	8.3%	41.7%	25.0%	16.7%
Prosumer empowerment	EC3. The percentage of users that earn at least the equivalent of their country's minimum wage by participating on platforms.	13	3.25	1.14	8.3%	8.3%	50.0%	16.7%	16.7%
Economic stimulation	EC13. The percentage of each platform's taxes that are paid in the same country where the revenue is made.	12	3.25	1.14	8.3%	16.7%	25.0%	41.7%	8.3%

n=12

---- = the line marks the mean/ midpoint of all 13 indicators

* measured with a qualitative scale

4.2. Social impact indicators

The 21 indicators in this impact area are organised into *community building/networking*, *social equality/bridging connections*, and *user empowerment* sub-dimensions, the latter including *trust and reputation* aspects and *monitoring and control* indicators. It is notable that the *community/network building* indicators dominate the ranking, followed by *social equality/bridging connections* and *trust/reputation* aspects of user empowerment. *Monitoring and control* indicators all ranked below the average indicator score (mean of 3.70). The full Round 3 results for the social dimension are displayed in table 3.

The ***community/network building*** sub-dimension refers to the degree and quality of interaction between users. It ranked on average highest within the social impact area. The indicator focused on how CC platforms build local interactions is the highest ranked indicator (S10). Closely related is the indicator which seeks to measure whether CC platforms result in offline social gatherings (S4, ranked 2nd). This capacity to ‘virtually’ stimulate local offline connections considers how *[CC] favours community relations and citizen collaboration: people help each other; first they form virtual communities that can then also be extended to off line contexts* [Expert 29]. The capacity for creating connections in general is one of the fundamental purposes behind CC, because, as Expert 15 states, *people who would have never met, meet with the sharing economy*. However, Expert 26 questions this assumption by asking, *how many of these interactions are [...] repeated?* In this sense, while pure one-off transactions might be relevant from an economic perspective it does not find consonance as a social indicator. Consequently, the indicator which measures users’ participation levels in terms of “average number of transactions per year” (S1, ranked 4th) is designed to measure how much involvement a user has in an online community, as opposed to engaging in one-off transactions. Similarly, the indicator S5 (ranked 5th) focuses on user involvement in forums, community spaces and online groups. “The % of non-monetized transactions (including alternative currencies), such as: swapping, gifting, bartering, etc.” (S11, in 1st position along with local interaction – S10) and “The % of total transactions based exclusively on alternative currencies, including time as a currency in time-banks” (S12, ranked 6th), are viewed as very important indicators.

The ***bridging connections/social equality*** sub-dimension expands on *community building/connections* by looking specifically at interactions between users from different socio-cultural and economic backgrounds. Two of the three *bridging connection* indicators, “The proportion of all interactions between users with different education levels” (S7) (a proxy for social class) and “The proportion of all interactions between users of different age groups” (S8) (a way of measuring age based digital exclusion) were jointly ranked seventh above both *user empowerment* and *monitoring and control* categories, and are considered to be at least ‘somewhat important’ by all experts. However, S6, which measures cross national interactions, was ranked at the bottom of the list, and on reflection

might be adapted to look more specifically at inter-ethnic or inter-cultural interactions.

The **social sub-dimension trust and reputation** indicators were mid-ranked. They focus on the systems or technological tools that CC platforms make available to users to facilitate the development of virtual ‘trust’ or ‘reputation’. In this respect, it is relevant to ask: *do platforms and activities increase participants’ trust and confidence in other participants, and people more generally?* [Expert 18]. The three highest ranked indicators focus on sophistication of user profile technology (S20, ranked 7th), the possibility of uploading videos and other forms of expression (S21, ranked 10th) and the complexity of crowd sourced rating systems (S22, ranked 10th). The features that enable users to identify products/services they are looking for was considered less important (S19, ranked 12th). Interestingly, the sophistication of virtual reputation systems (S23) was only ranked 16th, with a majority of the experts (55.6%) only rating it as ‘somewhat important’, suggesting, perhaps, that the experts were not entirely sure of its value or how it may work.

The **social monitoring and control sub-dimension** indicators evaluate the development of systems to create a safe environment for users. At a general level it is noteworthy that these measures are all ranked below the mean for the indicators as a whole (average mean 3.70). This indicates some level of disagreement about these indicators’ importance, though the fact that they all scored above 3.30 means that a small majority of experts rated the indicators as ‘important’ or ‘very important’. Whether or not platforms have procedures against abuse, fraud or impersonation (S17, ranked 14th) was the highest ranked monitoring indicator. Related, S15 (ranked 18th) seeks to measure the proportion of users “reported for abuse, fraud or impersonation”. The two other indicators focus on blocking and reporting systems: S18 (ranked 15th) aims to establish the ratio of misuse, while S17 (ranked 14th) acts as an overall measure of a platform’s procedures against misuse.

Table 3. Round 3 Results: Sub-dimensions and indicators of the SOCIAL impact dimension. Source: our own production

Category	Item description	Rank	Mean	Std. Dev.	Importance score (1 = very unimportant, 5 = very important)				
					1	2	3	4	5
Community building	S10. The % of all interactions between people from the same location/city/region.	=1	4.33	0.71	0.0%	0.0%	0.0%	11.1%	44.4%
Community building	S11. The % of non-monetized transactions (including alternative currencies), such as: swapping, gifting, bartering, etc.	=1	4.33	0.71	0.0%	0.0%	0.0%	11.1%	44.4%
Community building	S4. The % of users participating in meet-ups or events over the previous year.	3	4.22	0.67	0.0%	0.0%	0.0%	11.1%	33.3%
Community building	S1. Users' average number of interactions per year.	4	4.22	1.09	0.0%	0.0%	11.1%	22.2%	55.6%
Community building	S5. The % of users involved in online community spaces, such as forums, online groups/communities, etc.	5	4.11	0.78	0.0%	0.0%	0.0%	22.2%	33.3%
Community building	S12. The % of total transactions based exclusively on alternative currencies, including time as a currency in time-banks.	6	4.00	1.12	0.0%	0.0%	11.1%	22.2%	44.4%
Bridging connections	S7. The proportion of all interactions between users with different education levels.	=7	3.89	0.78	0.0%	0.0%	0.0%	33.3%	22.2%
Bridging connections	S8. The proportion of all interactions between users of different age groups.	=7	3.89	0.78	0.0%	0.0%	0.0%	33.3%	22.2%

Trust systems	S20. Development of the possible information that users can make available on their profiles.*	=7	3.89	0.78	0.0%	0.0%	0.0%	33.3%	44.4%	22.2%
Trust systems	S21. Options given to users to show themselves in images.*	=10	3.67	0.71	0.0%	0.0%	0.0%	44.4%	44.4%	11.1%
Trust systems	S22. Complexity and development of social trust rating systems.*	=10	3.67	0.71	0.0%	0.0%	0.0%	44.4%	44.4%	11.1%
Trust systems	S19. Development of the options available for users to select offers or search for them (making information more available and improving consumers' ability to choose).	12	3.67	0.71	0.0%	0.0%	11.1%	11.1%	77.8%	0.0%
Community building	S3. The % of recursive interactions on the platform between any two users.	13	3.67	1.23	11.1%	11.1%	0.0%	22.2%	44.4%	22.2%
Monitoring/control	S17. The level of development of procedures against abuse, fraud or impersonation.*	14	3.56	0.88	11.1%	11.1%	0.0%	33.3%	44.4%	11.1%
Monitoring/control	S18. The proportion of users reported for abuse, fraud or impersonation to total users on the platform.	15	3.56	1.13	0.0%	0.0%	22.2%	22.2%	33.3%	22.2%
Trust systems	S23. Complexity of the mechanism to build reputation.*	16	3.33	0.87	0.0%	0.0%	11.1%	55.6%	22.2%	11.1%
Monitoring/control	S16. Ratio of blocks and reports: The proportion of blocked, flagged or reported users to total users on the platform (e.g. 10 reports every 1.000 users).	17	3.33	1.41	11.1%	11.1%	22.2%	11.1%	33.3%	22.2%
Monitoring/control	S15. The level of development of systems to block, flag and report users.*	18	3.30	0.97	0.0%	0.0%	22.2%	44.4%	22.2%	11.1%

Community building	S2. The percentage of users whose participation is above total users average interactions over the previous year.	19	3.11	1.36	22.2%	0.0%	33.3%	33.3%	11.1%
Trust systems	S14. The proportion of interactions/transactions made by users in each reputation level.	20	3.00	1.00	11.1%	11.1%	44.4%	33.3%	0.0%
Bridging connections	S6. The proportion of all interactions between people from different countries.	21	3.00	1.23	10.0%	20.0%	30.0%	30.0%	10.0%

n=9

.... = the line marks the mean/midpoint of all 21 indicators

** measured with a qualitative scale*

4.3. Environmental impact indicators

Eighteen indicators were inputted to the Round 1 environmental indicator list, of which twelve were retained, adapted or consolidated, six were dropped and four new items were developed for Round 2. The open-ended questions in the environmental section were particularly revealing. A number of experts expressed the view that *[CC] contributes to the fight against climate change [...] that our ecological footprint is surpassing what the planet can withstand, and we have to live with less. CC makes it possible to [...] avoid overconsumption* [Expert 29]. In contrast, a significant proportion of the experts highlighted the potentially destructive contribution of CC through, for instance, ‘the rebound effect’, meaning that *it is only possible to determine the environmental impact if saved resources are offset against re-spent resources* [Expert 7]. The full Round 3 results for the environmental dimension are displayed in table 4.

Items in the **sustainable consumption** category received, on average, the highest ranking across all three rounds and focus specifically on behavioural changes to consumption patterns. This indicates that the experts view CC’s capacity to permit or facilitate consumers behavioural change as the most significant impact in this dimension. The top ranked item, which deals with “waste reduction due to sharing activities” (EV12, ranked 1st), typifies the view that *P2P communities make [better] use of existing products; there is less waste in the environment and a better use of resources* [Expert 13]. Closely related, the item that seeks to measure “the percentage of platform transactions/services that involved products that can be used” (EV1) was ranked 3rd. Somewhat similarly the promotion of product durability (EV14, ranked 5th) is another key idea that emerged in the open-ended questions related to how CC “increased quality, repairability, shareability and the longevity of products”.

Sustainable production sub-dimension

This sub-dimension examines sustainable supply chains and localisation. In the final round, seven *sustainable production* items were provided to the experts. Of these, two were ranked in the top five and two in the bottom three. The geographic sustainability indicator (EV10, ranked 1st) was the highest ranked. It measures the capacity to redirect production to the local level. In particular, it looks at how CC can favour *local production* and hence *local consumption [leading to more] sustainable models* [Expert 7]. Closely related, EV8 (ranked 4th) and EV9 (ranked 7th) consider the need to evaluate the “transportation efficiency” provided by CC in order to measure if it *leads to a net reduction in the environmental footprint* [Expert 22]. Two other indicators that consider disintermediation (EV11, ranked 5th) and hazardous waste reduction brought about through CC (EV13, 8th) receive high ratings.

Awareness and culture change sub-dimension

At an overall level the number of indicators in this category was reduced from six in Round 1 to two in Round 3, marking a notable downgrading as the

scoring progressed. This appears to be because macro type indicators gave way to more specific measurements and because there was an increased focus on the sustainable consumption sub-dimension. This is exemplified by the ranking of the Round 2 item “Encourages users to change their lifestyles” (EV3) in second place overall, to its ranking in more measurable terms in thirteenth place in Round 3, where it was defined as “the percentage of users participating in environmentally friendly programs” (EV4). The other *awareness/culture change* item focused on how platforms maintain or develop “sustainable codes and practices promoted by the platform” (EV3), and was ranked 9th by the experts.

Table 4. Round 3 Results: Sub-dimensions and indicators of the ENVIRONMENTAL impact dimension. Source: By authors

Category	Item description	Rank	Mean	Std. Dev.	Importance score (1 = not at all important, 5 = very important)				
					1	2	3	4	5
Sustainable consumption	EV12. The volume of waste reduction due to sharing activities (i.e. reutilization, second-life, etc.).	=1	5.0	0.00	0.0	0.0	0.0	0.0	100.0
Sustainable production	EV10. The percentage of platform exchanges and transactions that take place at local/city/regional level.	=1	5.0	0.00	0.0	0.0	0.0	0.0	100.0
Sustainable consumption	EV1. The percentage of platform transactions/services that involve products that can be reused.	3	4.8	0.50	0.0	0.0	0.0	25.0	75.0
Sustainable production	EV8. The percentage of shipments by inverse logistics or shared logistics.	4	4.3	0.50	0.0	0.0	0.0	75.0	25.0
Sustainable consumption	EV14. Evaluation of the promotion of product durability by platform users, through such actions as usage recommendations, suggestions or instructions for more efficient and sustainable use.*	=5	4.3	0.96	0.0	0.0	25.0	25.0	50.0
Sustainable production	EV11. The percentage of products/services offered by providers directly to consumers (e.g. farmers, crafters, etc.).	=5	4.3	0.96	0.0	0.0	25.0	25.0	50.0
Sustainable production	EV9. The percentage of vehicles involved in platform transactions with pollution abatement technology (hybrid, electric, etc.).	7	4.0	0.00	0.0	0.0	0.0	100.0	0.0

Sustainable pro- duction	EV13. The percentage of waste reduction that involves hazardous waste, such as electronic devices, toys with batteries, appliances, etc.	8	4.0	0.82	0.0	0.0	25.0	50.0	25.0	
Awareness/culture change	EV3. Evaluation of sustainable codes and practices promoted by the platform.*	9	4.0	0.82	0.0	0.0	25.0	50.0	25.0	
Sustainable consumption	EV2. The proportion of environmentally friendly products/services or those with instructions regarding environmentally safe use or disposal on the platform.	10	3.8	0.50	0.0	0.0	25.0	50.0	25.0	
Sustainable pro- duction	EV6. Adoption of monitoring and evaluation of environmental sustainability performance.*	11	3.5	1.00	0.0	0.0	75.0	0.0	25.0	
Sustainable pro- duction	EV5. The proportion of the platform's annual budget dedicated to improve the environmental sustainability of sharing activities.	12	3.0	1.16	0.0	50.0	0.0	50.0	0.0	
Awareness/culture change	EV4. The percentage of users participating in environmentally friendly programs (e.g. recycle, clean-up initiatives, etc)	13	2.8	1.26	25.0	0.0	50.0	25.0	0.0	

n=4

..... = the line marks the mean/midpoint of all 13 indicators

* measured with a qualitative scale

5. RESULTS ANALYSIS

The objective of this research was to develop a series of indicators that would provide a comprehensive and independent framework for monitoring the impact of collaborative consumption. The purpose of such a framework is to assist policy makers and public administrators in their efforts to develop policy and regulation. This framework serves also for conceptualising collaborative consumption impacts and improving further research, and it can be summarized in the following figure, composed of a nine-element sub-structure to the three general impact dimensions (figure 1).

Figure 1. Collaborative consumption impact dimensions and sub-dimensions.
Source: By authors.

ECONOMIC	Prosumer empowerment	Consumer empowerment	Economic stimulation
	Empowerment of 'prosumer' to generate wealth (or other social benefits) by taking advantage of idle/ excess capacity	Empowerment of the consumer through pricing, choice and access	Macro level measures of economic impact
SOCIAL	Community building/ networking	Social equality/ bridging connections	User empowerment (trust systems / monitoring and control)
	The degree (or lack of) and quality of interaction between users	The degree (or lack of) and quality of interaction between users from different socio-cultural and economic backgrounds	Empowerment of users to interact with other users, normally through technological capabilities related to a) trust/reputation and b) control and monitoring
ENVIRONMENTAL	Sustainable consumption	Sustainable production	Awareness/ culture change
	Consumer actions that affect environmental sustainability through changes in consumer behaviour and consumption patterns	Development of new sustainable 'supply' chains, through 'localisation' of exchanges, disintermediation, sustainable transport etc.	Promotion of sustainable values and a culture of environmental awareness

The *economic dimension* contains thirteen indicators in three sub-dimensions, including: *prosumer empowerment*, *consumer empowerment* and *economic stimulation*. Notable was the way the experts helped to develop items that would conceptualise *prosumer empowerment* as separate from *consumer empowerment*. This implies the continuity of the structural barrier between providers and consumers, eroding the very idea of the “prosumer” as a concept. In addition, the providers to consumer ratio (EC10) is in the lower positions of the ranking, implying that economic experts do not even consider this to be a main feature of the collaborative consumption trend. In fact, this result weakens arguments for it to be associated with a new way of consumption. In contrast, most of the main indicators had to do with direct earnings and advantages: purchasing power, monetization, impact on local economy, money earned, money spent. These are mainly indicators related to the efficiency of the model, and not really with the development of new economic dynamics. In this sense, through their choices, the economic experts framed what can really be expected from this trend, which is not a paradigmatic change in consumption, but rather a more efficient system of economic stimulation. In this regard, the only two remarkable innovative characteristics are its prospects to improve local economies and the relevance of reputation regarding income, that is, how it is converted into a new currency. Finally, ranked lowest of all, there is the indicator of tax contribution in the country of operation. Given the ongoing controversy related to regulations and tax this is somewhat surprising. Taken as a whole, it is notable how the economic indicators focus heavily on the individual (prosumer or consumer) rather than systemic measures. In this respect, it would seem crucial that they be measured in conjunction with the social and environmental dimensions.

The *social dimension* was the most complex impact area, containing 21 indicators in three sub-dimensions. It is notable that the two highest ranked sub-dimensions, *community building/ networking* and *social equality/ bridging*, reflect the experts’ view that the impact of collaborative consumption on ‘connections’ between people and also between people of different societal cohorts is a critical area. As we noted in the literature review, developing connections is one of the main claims made by proponents of the collaborative economy, but the nature and quality of these relations have been called into question. Our own research suggests that technologically heavy distributed-network type platforms may account for a high proportion of connections, but that they are oriented toward ‘managed’ one-off transactions by individuals rather than being relationally focused (de Rivera et al., 2016). Using the suggested indicators, which measure local, non-monetary and alternative currency transactions, and wider-participation, it should be possible to shed further light on the nature and quality of social transactions.

Closely associated, but with a lower overall importance rating, are a group of indicators designed to measure to what degree platforms technologically facilitate users’ interactions through trust and reputation systems and monitoring and control procedures. Trust and reputation systems have been reported to be unreliable (Codagnone et al., 2016) and to reduce the quality of social connec-

tions (Parigi & State, 2014). From a relational perspective, it is important to measure these impacts at platform level and to further study how benefits are subsequently accrued at the economic level (in terms of *prosumer* and *consumer empowerment*) and how this may come into conflict with other social concerns.

Finally, there is the *environmental dimension* that caused us some difficulty in the final multipanel round. We have chosen to present the mean scores of the ranks by the four participating experts, which at first may seem overly restricted even for a Delphi. Undoubtedly, this is not ideal, but it should be taken into consideration that Round 3 indicators are merely the most advanced version of those developed in Rounds 1 and 2, where thirty-two and twenty-nine experts participated, respectively. Here, the three sub-dimensions are: *sustainable consumption*, *sustainable production* and *awareness/cultural change*.

In the *sustainable consumption* sub-dimension, the experts focus on environmental gains due to changes in consumption, such as waste reduction, re-use and curatorship/durability of product use. These first-order effects are the most commonly claimed benefits of collaborative consumption and it is necessary to measure them; however it should also be considered that there is a certain limitation in the indicators, as systemic wide waste and costs of maintaining a digital economy are not considered (Pargman et al, 2016; Kostakis, Roos & Bauwens, 2016). In any case, such second-order effects are probably beyond the scope of this research. Furthermore, this sub-dimension has an important relationship to the *prosumer and consumer empowerment* sub-dimensions in terms of economic impact, as there may be considerable conflict between the impact of prosumers offering cost-competitive spare resources and consumers having greater economic power, ultimately leading to hyper-consumption with many secondary environmental costs. In this respect, the *sustainable production* sub-dimension focuses on geographic sustainability, transport efficiency, disintermediation and waste reduction and should also be considered in terms of its inter-relationship with economic impacts.

6. CONCLUSION

In March 2011, *Time* considered the sharing economy as one of the “10 Ideas That Will Change the World” under the headline “Today’s Smart Choice: Don’t Own. Share” (Walsh, 2011). This publication became a “must” for first wave sectorial reports and early academic studies on the sharing economy and collaborative consumption (approximately 2010-2016), regardless of whether they were advocates or critical. However we do not remember any commentary directed at the subtitle of this already hackneyed publication, which reads as follows: “Our best shots for tackling our worst problems, from war and disease to unemployment and deficits”.

A decade later, most of what was considered as the sharing or collaborative economy seems to be more part of the problem than the solution, as it is increasingly linked to job precariousness, over-consumption and gentrification.

Over time, the term has been substituted by others, such as platform economy or platform capitalism, which emphasize the for-profit dynamics behind this so-called “socio-economic movement” (Botsman & Rogers, 2010). In addition, criticisms have grown over the last decade, mainly focused on controversies about the accuracy of “sharing” or “collaborating” describing the nature of these platforms (Belk, Eckhardt & Bardhi, 2019). In this context, the lack of independent research on their actual impact in society has maintained the debate on the theoretical and political level.

The proposal by four European consumer organizations--OCU (Spain), Test Achats (Belgium), Altroconsumo (Italy) and Deco Proteste (Portugal)—to carry out a broad research project measuring the impact of collaborative consumption platforms was a courageous move aimed at addressing these controversies (OCU, 2016). The underlying aim of this initiative was to empirically test the “collaborative consumption hypothesis”, that is, the argument that these platforms will help to resolve economic, social and environmental issues. Thus, we were looking to tackle the impasse in the theoretical discussion by means of empirical research. In this regard, this is the first independent research project with such an aim, and the Delphi study presented here is at its core.

For the purpose of our research, we followed the canonical definition of collaborative consumption, but operationalized the concept as the practice of peer-to-peer exchange platforms that operate in several economic sectors. Our lead was seconded by subsequent research on the issue, such as the European Commission’s “Exploratory Study of consumer issues in peer-to-peer platform markets” (2017), a key report for the development of legal regulation of these economies, which was directly inspired by the experience of the research commissions of the aforementioned European consumer organizations.

As we explained in the methodological section, the aim of the Delphi study was to develop an assessment tool to measure the economic, social and environmental impacts of these platforms. This would make it possible to calculate the aggregate impact of the overall trend, either validating or refuting the “collaborative consumption hypothesis”. However, in doing so we had to account for the performance of each platform separately. This is highly relevant, because the main point of the collaborative consumption theory is that all peer-to-peer platforms are part of the same phenomenon or common trend. As a consequence, the mere intention of accounting for each platform’s performance destroyed the illusion that community based, non-for-profit platforms would have similar impacts as multimillion dollar platforms funded by venture capital. Thus, the report published from this research was the first institutional research report to openly question the claims of collaborative consumption advocates, as can be inferred by its title: “Collaboration or business? Collaborative consumption: From value to users to a society with values” (OCU, 2016).

However, as we pointed out before, the application of the Triple Impact Assessment Questionnaire was not successfully completed. First, there was resistance to providing data, especially from the most profit oriented platforms, who were not willing to provide information that could benefit their potential

competitors. Secondly, small organizations found it difficult to provide detailed data. Finally, the major issue was the wide range of activities that had to be evaluated with a single questionnaire. This was the result of the assumption that collaborative consumption platforms shared very similar or equivalent dynamics, which was empirically impracticable. To empirically account for this diversity, we conducted netnographic research that was included in the same project and has been discussed elsewhere (de Rivera et al., 2016). This also contributed to questioning and countering the most unrealistic claims of the advocates of the sharing and collaborative economy. Our subsequent work intensified this line of critical research, leading us to the conclusion that collaborative economy discourses were a complex marketing strategy on behalf of the major companies of the sector (de Rivera & Gordo, in-print).

At the same time, theoretical debates on the phenomenon were mainly focused on the meaning of sharing and its incompatibility with profit driven markets. A considerable amount of literature on the topic is based on the original idea of a not-for-profit sharing economy that was later co-opted by corporations, while other scholars try to establish coherent definitions of what the sharing economy is (Frenken & Schor, 2019). Indeed, there are several proposals to recapture the failed promises of the sharing economy by developing new organizational models based on shared platform ownership and democratic decision making (Schor, 2014; Orsi, 2014; Sholtz, 2014).

Following this trend, many have seen the potential of digital platforms to supersede capitalist values and dynamics, opening the way to more sustainable narratives for the sake of human survival (Schröder et al., 2019). Current conceptions of a circular economy and degrowth are increasingly being considered as two major prerequisites to operate within ecological planetary boundaries, especially in view of the challenge posed by a post-coronavirus economy (Boffey, 2020). In this regard, research such as that presented here provides a methodological and theoretical framework to develop tools to measure the impact of new digital economic models based on peer-to-peer platforms. The three-dimensional framework, with its nine sub-dimensions, offers a valuable starting point to understand how and in what areas online exchange platforms can contribute to positive social transformation.

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