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Collaborative Consumption: A Proposed Scale for Measuring the Construct Applied to a Carsharing Setting

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Abstract: In recent years, there has been a significant shift towards greater collaboration in various spheres of society, in which the creation of value from shared resources while balancing self-interest and community well-being is emphasized. Consumption has ceased to be characterized exclusively by the purchase and possession of goods; instead new collaborative initiatives represented by exchanges, loans, renting, and other forms of sharing that allow consumers access to a good or service only in the time they are necessary have appeared. However, few studies have attempted to measure the reasons that lead consumers to practice collaborative consumption. Therefore, the main objective of this article is to propose a scale that measures the motivators, facilitators, and constraints for this mode of consumption. For this, a study was conducted among carsharing users in Brazil, which aimed to purify and validate the proposed scale. The results indicate that collaborative consumption applied to a carsharing setting is composed of six dimensions and confirm the validity and reliability of the studied construct. The discussion highlights the study findings and offers suggestions for further research into this topic.

Keywords: consumer behavior; collaborative consumption; carsharing

1. Introduction

Changes in society and its members influence new forms of consumption of goods and services. Various cultural and structural factors such as increased purchasing power, an aging population, and the increasing value attributed to quality of life are seen to be among the elements responsible for the entry of new consumers and new consumption practices. Added to this are motivations related to the appreciation of environmental and social issues of greatest impact on people's daily lives, such as traffic congestion, problems caused by global warming, population growth, and a greater awareness of the importance of sustainability, which often lead individuals to seek radical solutions to their problems [1–3].

There is an ongoing theoretical and managerial debate on collaborative consumption, taking place mainly in Europe and North America, regarding consumption practices related to what is described as sharing [4–6], commercial sharing systems [7], and access-based consumption [8]. According to Leismann et al. [9], services that promote the use rather than the possession of a good need to be expanded, while product sharing, as well as the new collaborative models, have great potential to

alter consumption patterns and lifestyles. Among the wide range of solutions that combine products and services capable of satisfying consumer needs are commercial systems for shared use (in the short or long term), as well as services that lead to the recovery and reuse of components and goods, such as exchange and donation. These assertions corroborate the basic assumption underlying collaborative consumption that is based on collaboration between individuals and enabled primarily by virtual platforms.

At the core of this transformation, understanding the influences and determinants of consumer behavior is a key issue, and thus a new research field within the scope of consumer behavior studies has emerged. From the academic point of view, some studies show that tangible benefits such as access, mobility, reward, and cost reduction can be obtained through the new consumption model based on the sharing of goods and services in the most varied segments such as transportation, food, financial services, and lodging, among others.

From a business perspective, managerial studies have also contributed to developing an understanding of the topic. A great number of such initiatives are being developed around the world and companies such as Netflix, Zipcar, and Airbnb are recognized examples of initiatives in several markets [10]. Concerning the collaborative consumption platform used in this study, carsharing, the worldwide market today encompasses nearly 5.8 million customers. In the Asia-Pacific region, the largest market, there are 2.3 million users and 33,000 vehicles. The largest service per capita, however, is in Europe, with 2.1 million users and 31,000 vehicles. On the other hand, North America accounts for 1.5 million users sharing 22,000 vehicles [11]. By 2021, according to the Boston Consulting Group [11] (p. 2) '35 million users will book 1.5 billion minutes of driving time each month and generate annual revenues of €4.7 billion'.

This view is consistent with the findings reported by Kang et al. [12] (p. 10); 'that carsharing demand is high in an area where a higher proportion of building floor area is used for business, and which has a higher proportion of young residents in their 20s and 30s'. That is why this result can be used to forecast carsharing demand, especially in Asian cities with urban conditions similar to Seoul, where the study occurred. Another example, implemented in Barcelona, Paris, Berlin, and Rotterdam, is electric vehicle sharing (EVS), an alternative providing a cleaner transport mode [13].

Compared to other markets, Brazilian initiatives are still timid, yet new collaborative consumer businesses have emerged. The growing trend could seem contradictory, since it competes with national economic growth that took place in Brazil until early 2014, driven by policies designed to stimulate consumption, with increased credit and a consequent growth in the retail sector. However, the two models seemed to coexist within contemporary society in which we have an economy where ownership rivals convenience of access and encourages changes in consumption behavior. Among the existing Brazilian options, consumers can find services such as carsharing, monthly toy rotation, community bicycles, sites offering free loans, and the renting of objects that are enabled through platforms or online consumer systems [14].

Although all the existing academic and managerial research has been fundamental to the production of knowledge regarding the sharing of goods and its motivations and constraints, there is a notable absence of studies that provide a complete and valid scale for evaluating the dimensions that make up collaborative consumption. Möhlmann [15] proposed a framework based on the determinants of satisfaction with a sharing option and the likelihood of choosing a sharing option, but the author's focus was on motivators and their relation to outcomes and was largely based on trends and technology, while failing to mention the constraints. Therefore, it is of fundamental importance to better understand the variables present in this new consumer behavior.

Accordingly, the main objective of this article is to propose and test a scale for measuring the construct of collaborative consumption applied in a carsharing setting. To do so, firstly, research of an exploratory nature was undertaken to better understand the dimensions that make up collaborative consumption and to generate items for the construction of a measurement scale. Subsequently,

a descriptive analysis was carried out to purify and validate the measurement items by applying the scale to a sample of carsharing users in Brazil.

2. Literature Review

2.1. Collaborative Consumption Definitions

The determinants of collaboration between individuals and the predisposition to sharing can be evaluated according to the theoretical assumptions of collective action. Olson [16] argues that individuals must undergo external pressure to act cooperatively in building and managing common assets and to secure their own long-term interest. In Ostrom's [17] view, collaborative behaviors require a certain level of cooperation and identification among the participants. Therefore, for collective action to occur the individuals need to be more likely to collaborate and there must be mutual trust between them.

To define the concept of collaborative consumption, according to Belk [4], it is necessary to consider the acquisition and distribution of resources during activities among individuals. From this premise, collaborative consumption occurs in coordinated events between consumers for the acquisition and distribution of a resource based on a value or other form of reward, such as barter, trade, and exchanges involving non-monetary compensation.

Belk [6] emphasizes that this definition of collaboration excludes gift giving, which is characterized by the permanent transfer of ownership, while the terrain occupied by collaborative consumption is a compromise between sharing and market transactions, bringing together properties inherent to both. Add to this the premise that the sharing of goods (tangible and intangible) 'is an interpersonal process that is sanctioned and prescribed by culture', and, although it has not been well differentiated in the literature, sharing can be seen as a third form of distribution distinct from the exchange of goods and donation [4] (p. 130).

Along the same lines, Bardhi and Eckhardt [8] describe the domain and motivation of collaborative consumption as temporary access to goods and consumption experiences, rather than purchase and possession; that is, a market-mediated access. According to Botsman and Rogers [1], the strengthening of a new form of consumption accompanies the emergence of a socioeconomic era in which hyper consumption has begun to show signs of waning and is no longer at the center of human motivation. In its place, a greater concern with the exhaustion of natural resources encourages the better use of products. The idea of reusing products during the useful life of the good in the form of loans, rent, exchange, or resale is translated into the awareness that one must extract the maximum from what is consumed. This assumption is aligned with the belief in the common good, that is, to the understanding that the performance of some action, taking into account the general good of the community or an individual, is one of the essential principles of shared consumption [1].

Collaborative consumption, in the conception of Botsman and Rogers [1], is based on the technologies and behavior related to online social networks. Such interactions would seem to suggest the concept that collaboration does not have to occur to the detriment of individualism; rather, it enables a system in which people share resources without losing personal liberties and without sacrificing their lifestyle.

2.2. Collaborative Consumption Systems

Participation in collaborative consumption occurs in different forms and varies in terms of scale, maturity, and purpose. Botsman and Rogers [1] identify three distinct systems of collaboration, described below.

Product service systems are defined as a form of consumption in which one pays for the use of a product without the need to acquire it. The key benefit of this system is the absence of any obligation to definitively purchase the product on the part of the user, and, in the case of increased need to use the product or service, access for consumption can also be increased. For Lamberton and Rose [7], the

presence of rivalry, exclusivity, and the availability of the shared products are essential characteristics to be added to this model.

Redistribution markets are characterized by relationships of exchange and donation such as the donation of furniture, the exchange or loan of books, and the exchange or donation of clothes. In this case, donation and exchange are related to the transfer of ownership. This system encourages the use and redistribution of old or unused items and contributes significantly to waste reduction.

Finally, collaborative lifestyles consist of the interaction of people with similar interests and the desire to share less tangible assets such as knowledge, resources, space, skills, and time, such as sharing time to learn a language. In addition, because it concerns sharing based on social interaction, a high degree of trust among the participants of the system is required.

2.3. Motivators, Facilitators and Constraints of Collaborative Consumption

Research shows that consumer participation in collaborative systems is generally associated with sustainable behavior that reverts to positive social and environmental outcomes [3], assuming that the use efficiency associated with reducing waste and absorbing surplus created by excess production and consumption are also motivating factors for collaboration, as they provide significant environmental benefits.

Rational and economic attributes such as the maximization of the use of the goods and cost savings are also pointed out as advantages associated with the collaborative consumption [4,7]. Along the same lines, Sacks [18] claims that individuals tend to engage in collaborative consumer systems because they allow access at lower costs.

Another important aspect that is considered a facilitator of collaborative practices is the trust placed in social relations as well as in organizational and institutional relationships [1,16]. To establish trust, there are some essential conditions, among which facing risks, a perception of loss, interdependence between the interests of the parties involved, the choices and alternatives available, and uncertainty about the expectations of other parties stand out. Lamberton and Rose [7] add that trust between individuals with similar behaviors can generate a high level of sharing with other similar individuals regardless of the pattern and intensity of use of the good or service being shared. In this context, it can be inferred that the social relations established among the individuals participating in the collaborative consumption can be facilitated by the presence of bonds of trust. Hence, trust will be seen as a facilitator for collaborative consumption practices in this study.

The studies by Hamari et al. [19] found that the extrinsic motives that lead users to use collaborative consumer platforms are focused on practical needs related to benefits in terms of economy, time, and recognition or reputation, which have a significant effect on people and their readiness to participate in sharing initiatives. On the other hand, the intrinsic motives are social and environmental in nature, being associated with ecological sustainability and pleasure, such as meeting or helping people and contributing to a sustainable and healthy environment, and have a greater impact on people's attitudes towards shared consumption.

Included in this discussion are findings from the study by Lamberton and Rose [7], wherein the results showed that the perceived risk of scarcity has a determinant effect on the probability of sharing, i.e., the consumer not only considers their own participation in these systems but also the participation and the demand from the partners in the sharing system. Sharing can also be considered a form of resistance to consumption, translated into actions based on anti-consumption attitudes. In this case, goods, when shared, become co-owned and consequently there is a natural reduction in the expectation of individual purchases by consumers [4,20].

Feelings of possessiveness and attachment made explicit by the importance given to what is possessed are mentioned by Belk [5] as possible impediments to sharing. Possessiveness affects the intention and willingness to share because of people's strong emotional connection and the feeling of domain over and attachment to their possessions. Similarly, Mont [21] postulates that current

consumption patterns can be considered barriers to sharing since a large number of individuals are predisposed to the instinctive accumulation of what money can buy.

Ornellas [22] also noted some implications considered unfavorable to the practice of sharing in Brazil, such as insecurity *vis-à-vis* the availability of goods when the need for use arises. Attachment to things is also seen as a constraint because it involves not using one's own good, considered by many consumers as a symbol of social status.

From the business perspective, managerial studies have also contributed to the understanding of the topic. The adherence of consumers to a shared transportation option includes motivators such as reducing the periodic expenses associated with owning a vehicle (taxes, maintenance, and fuel), concern for the environment, and issues related to the convenience of use that the service offers [23].

Table 1 presents a summary of the motivators, facilitators (trust) and constraints to the practice of collaborative consumption, based on the bibliographic review.

Table 1. Synthesis of the motivators, facilitators, and constraints of collaborative consumption.

Motivators/Facilitators	Conceptual Definitions	References
Socio-environmental consciousness	Sustainable behavior that reverts to positive social and environmental outcomes. The efficiency of use associated with the reduction of waste and the absorption of surplus goods.	[1,3,24]
Cost savings	The ability to reduce spending on product acquisition or access to lower costs.	[1,7,25,26]
Trust	Trust placed in both social and organizational relationships, regardless of the standard or intensity of use of the good.	[7,16]
Convenience	The ability to provide comfort or well-being to the individual and facilitate their routine.	[7,22,26]
Resistance to consumption	Reduction in the expectation of purchases when the goods are shared (joint ownership).	[4,20]
Constraints	Conceptual Definitions	References
Risk	The expectation of problems and consideration of uncertainties in the search for lower risk in the decision-making process.	[7]
Possessiveness and attachment	A strong emotional bonding of people and sense of domain over and attachment to their possessions.	[4,5,21,22]
Privacy	Care taken with the shared good, manifestations of concern with the maintenance of the good state of belongings and with the collective living environment.	[5]

3. Carsharing as a Collaborative Consumer Platform

Carsharing, which is recognized as a form of goods supply service, is intended for consumers seeking to meet the need for individual mobility but who do not necessarily need to own the car, thus reducing journeys with the private vehicle and leading the consumer to adopt more sustainable behavior [2]. Carsharing is the sharing platform used in the present study.

The carsharing market is rapidly expanding and, according to a research report by Navigant Research [27], the projected worldwide revenue from carsharing services will be about \$6.2 billion by 2020. Studies by Millard-Ball et al. [28] indicate that shared use of private cars plays an important role in reducing congestion and pollution rates because many individuals reduce or cancel car purchases or sales after becoming members of carsharing programs. This implies a reduction in the number of vehicles on the road and demonstrates an environmentally friendly strategy for organizations.

Notably, for some cultures, the possession of a private car has long been associated with a form of status and freedom. However, Efthymiou et al. [29] showed that this perception is beginning to

change, particularly among younger people, driven by the emergence of a new ethos of collaborative consumption, in which access to the good or service, rather than its ownership, is seen as being primordial among a generation that seeks the ease and convenience of using a product and is willing to give up a little flexibility in exchange for participation in a collaborative consumption system.

In Brazil, carsharing is rapidly growing. There are now more than six carsharing companies operating in Brazilian cities [30], including Zazcar, the first one to launch the service in 2009 in São Paulo [31]. Currently, Zazcar has about 7.5 thousand registered users, with a fleet of vehicles distributed across 50 points within the city of São Paulo [32].

In essence, carsharing appears to be a catalyst for a wide variety of commercial systems that can provide the consumer the benefits of service access and regular use of goods, especially in large urban conglomerates, given the intensity of use, occupancy of physical space, and the costs of acquisition and maintenance of the good by the owner.

4. Methodology

The research was carried out in two main stages, the first being exploratory in nature and the second descriptive. The process of developing the proposed scale will be presented considering both stages. Finally, the process of validating the scale is presented. All procedures were performed in accordance with the recommendations of Churchill [33] and DeVellis [34].

4.1. Developing the Scale—The Exploratory Stage

The exploratory stage consisted of specifying the construct domain and generating items for the scale by reviewing the measurement items identified in the literature and supported by in-depth interviews. A bibliographic investigation was conducted to interpret information relevant to the purpose of the research, based on academic studies of diverse empirical natures on collaborative consumption. Journals from the area of marketing and psychology were consulted to find articles related to collaborative consumption, its motivators, facilitators, and constraints. The knowledge acquired on the research topic served as the basis for the elaboration of the script for the in-depth interviews and permitted the visualization of items to be used on the scale.

Nine in-depth interviews were conducted with users, experts, and managers of carsharing companies in Brazil and abroad who reported their experiences of sharing goods. The sample members were selected based on their experience and habits of use. The contents of the interviews were categorized, and a strong convergence was found between the collaborative consumption motivators, facilitators, and constraints present in the literature and those mentioned by the interviewees. Accordingly, when elaborating the scale, the measurement items were mainly adapted from the studies by Hamari et al. [19], Shaefer [26], Lamberton and Rose [7], and Ornellas [22], with the support of the in-depth interviews. Afterwards, we proceeded with the process of confirming the theoretical structure of the scale through conversations with three experts from the marketing area and two experts on the topic of collaborative consumption in Brazil. The items with no Portuguese language version were translated considering the distinction between the original studies and the proposed study.

Following DeVellis' [34] guidelines, two marketing academics and a market expert later evaluated the comprehensiveness of each of the translated items and suggested adjustments to the scale items. Thus, the first version of the scale included 30 items that could compose the collaborative consumption construct, divided into seven broad dimensions: cost savings; convenience; socio-environmental consciousness; belief in the common good; social identity, defined as motivators; trust, defined as a facilitator; and risks, defined as a constraint. Table 2 shows the first version of the scale to measure the collaborative consumption construct.

Table 2. Proposed scale for the measurement of collaborative consumption.

Dimension	Code	Item	Adapted from
Cost savings	CC1	I use the carsharing service because, by doing so, I can cut my costs.	[18,22]
	CC2	Participating in carsharing benefits me financially.	[19]
	CC3	I use carsharing because it is cheaper than other means of transportation.	[26]
	CC4	I use carsharing because I only pay for the usage time.	*
Convenience	CC5	I appreciate using the shared car and not having to worry about parking spaces or parking.	[7,22,26]
	CC6	I appreciate not having to worry about collective transportation schedules (bus, subway, train, ferry, catamaran) for my trips.	*
	CC7	I appreciate not having to worry about filling the tank in the car.	*
	CC8	Carsharing means there is always a vehicle available for use when I need one.	[7]
	CC9	I prefer the freedom of using my car at any time to using a shared car. **	[22]
	CC10	The possibility of using different models of vehicles, according to my need, is an attraction of carsharing.	[7,22]
	CC11	Using the shared car saves me time.	[19]
Socio-environmental consciousness	CC12	I appreciate the convenience of using the shared car for my trips.	[29]
	CC13	Using a shared car is a sustainable mode of consumption.	[19]
	CC14	Using a shared car reduces the consumption of natural resources.	[7]
Belief in the common good	CC15	Using carsharing services means thinking about the environment.	[19]
	CC16	Leaving a car idle and unused for most of the day seems inappropriate to me.	[7]
	CC17	Using carsharing services means thinking about others and the community.	*
Social identity	CC18	I feel good when I share resources and avoid overconsumption.	[20]
	CC19	Using carsharing allows me to be part of a group of people with similar interests.	[7]
	CC20	Using carsharing improves my image <i>vis-à-vis</i> the community and society.	[19]
Trust	CC30	I feel accepted by the community and society when I use carsharing.	[35]
	CC21	I trust the carsharing operating model.	[7]
	CC22	I trust the carsharing services I use.	[7]
	CC23	I trust the members who participate in the carsharing program.	[7]
Risks	CC24	The carsharing service is safe.	[26]
	CC25	I'm afraid of not being able to use the shared car when I need to use it. **	[7]
	CC26	I'm afraid of not being able to familiarize myself with the controls of different cars every time I use them. **	[7]
	CC27	I fear the car will not be suitable for use (maintenance, cleaning) when I need to use it. **	*
	CC28	Having to book the car every time I need to use it is inconvenient. **	[7]
	CC29	Having to find the car pick-up point is inconvenient. **	[7]

* Proposed item for the study; ** Reverse item.

4.2. Developing and Validating the Scale—The Descriptive Stage

The descriptive stage of the process of developing the collaborative consumption scale began with a pre-test of the data collection instrument conducted among six people from the same study population, with the aim of minimizing bias in the responses and identifying variables in which there were problems related to comprehension. Following that analysis, the recommended items were modified in order to increase the comprehensibility and clarity of the instrument.

To test, purify, and validate the scale, the survey was applied to a population composed of active users of the carsharing service. The participants were selected from the customer database, which was provided by the main carsharing company in Brazil, Zazcar [36]. The consumers researched were residents of the biggest Brazilian city, São Paulo. In this sense, Kang et al. [12] emphasizes the importance of studies based on real carsharing usage data.

Data collection was carried out in late December 2014, considering a cross-sectional sample. A questionnaire containing the developed collaborative consumption scale and other questions designed to characterize the respondent's demographics and usage profile. The data were collected by sending emails containing the survey link to the company's customer base. The online application format was chosen based on the sample profile and the convenience of sending it to different individuals [36]. Approximately 1800 active users (60% of the total company base at the time) received the link with the survey, and at the end of the collection period a sample of 124 completed questionnaires was registered, representing a return rate of 6.9% of the base used.

The procedures used to test and purify the scale were based on the recommendations of DeVellis [34], in which exploratory factor analysis (EFA), the communalities of the items, the measure of reliability through Cronbach's alpha, and the consequent item-to-item and item-total correlations were used. The analysis was made with the aid of SPSS (IBM, New York, NY, USA). In addition, following the

orientations of Hair et al. [37], the univariate outliers were examined using the Z coefficient test, and the presence of multivariate outliers was also analyzed by measuring the Mahalanobis distance (D^2) [38,39]. Minor problems of normality were eliminated following the criteria suggested by Kline [39].

All the items in the scale were measured using Likert-type scales with seven points and subtitled at the extremes. The collaborative consumption scale was validated based on its content validity and construct validity. Validation of the construct was achieved through confirmatory factor analysis (CFA), using AMOS software.

5. Results

Regarding the sample profile, the majority of the respondents were men (76%), 25 years and over, and with a college degree (85%). Almost 80% of the sample does not own a car. Concerning carsharing usage, 70% stated they use the car for leisure and 50% use it for shopping (in a multiple-choice question).

5.1. Scale Development and Purification

To achieve the broader goal of this study, we started eliminating redundant items or those with low factor loadings, thus improving the scale's properties. We used principal component analysis with an orthogonal rotation to examine and interpret the factors [34]. The cut-off criterion for factor retention was an eigenvalue equal to or larger than 1 [36]. The Kaiser-Meyer-Olkin (KMO) test was used to indicate the adequacy of the data to the factor analysis. The sample is adequate if the value of KMO is greater than 0.6. Bartlett's test of sphericity was also checked, and the null hypothesis of no correlations between the variables was rejected for all the analyses.

Acceptable values for each of the other tests are explained in the literature. According to Hair et al. [37], items with communalities lower than 0.5 should be removed. To examine the scale's reliability, we calculated the Cronbach's alpha (minimum recommended of 0.6) and the item-total correlations, for which values above 0.5 were expected [34,36]. We also assessed the item-to-item correlations, for which the maximum score of 0.8 for a correlation between two variables was considered [39].

In addition, regarding the exploratory factor analysis (EFA), Hair et al. [37] suggest only interpreting factor loadings with an absolute value greater than 0.4, the guideline that was followed in this study. To perform the reliability and correlation tests, some items were regrouped according to their conceptual coherence and their factor loadings.

To make the final rotated solution satisfactory, factor analysis was processed ten times. The results obtained before the adoption of the final scale, in general, presented inadequate structures, with the presence of cross-loading items and items with low communalities, as well as the existence of theoretical mismatch of some items in their original dimensions. Table 3 summarizes the EFA process and specifically indicates the items that were eliminated (and why) during the development of the collaborative consumption scale.

Table 3. Summary of the exploratory factor analysis (EFA) process.

Factor Analysis	Eliminated Item	Reason for Elimination
1	CC16	Low communality
2	CC23	Cross-loaded on more than one factor
3	CC4	Magnitude of the factor loading
4 and 5	CC7; CC8	Low communalities and unacceptable item-total correlations
6	CC26	Magnitude of the factor loading, alpha level, and unacceptable item-total correlation
7	CC5	Magnitude of the factor loading, alpha level, and unacceptable item-total correlation
8	CC9	Cross-loaded on more than one factor, alpha level, and unacceptable item-total correlation
9	CC3	Alpha level, unacceptable item-total correlation, and lack of theoretical adherence between the item and the loaded factor

Thus, the final structure for validation was composed of six factors (Table 4). Items originally associated with two distinct dimensions, socio-environmental consciousness and belief in the common good, were clustered around a single factor, Factor 1. A strong conceptual relationship is assumed to

exist between the two dimensions since motivation and greater awareness of social and environmental issues lead to an increasing number of people seeking alternative solutions to their individual problems as well as collective issues. Hence, the items were included in a single dimension referred to as socio-environmental consciousness. The reliability measures were acceptable, with alpha statistics higher than 0.6. The KMO test of sampling adequacy was 0.749, and Bartlett's test of sphericity was found to be significant. The total variance explained was 70.216; the percentages for each factor are presented in Table 4. The results of this final orthogonal rotation were also confirmed in an oblique rotation, which sustained its robustness.

Table 4. Exploratory factor analysis: final structure.

Code	Item	Factor Loading	Com. ¹
Factor 1—Socio-environmental consciousness Cronbach alpha 0.882 Percentage of Variance Explained 15.859			
CC15	Using carsharing services means thinking about the environment.	0.898	0.884
CC14	Using a shared car reduces the consumption of natural resources.	0.887	0.847
CC13	Using a shared car is a sustainable mode of consumption.	0.745	0.718
CC17	Using carsharing services means thinking about others and the community.	0.684	0.690
CC18	I feel good when I share resources and avoid overconsumption.	0.557	0.560
Factor 2—Social identity Cronbach alpha 0.868 Percentage of Variance Explained 12.424			
CC20	Using carsharing improves my image <i>vis-à-vis</i> the community and society.	0.818	0.805
CC30	I feel accepted by the community and society when I use carsharing.	0.807	0.765
CC19	Using carsharing allows me to be part of a group of people with similar interests.	0.786	0.751
Factor 3—Trust Cronbach alpha 0.862 Percentage of Variance Explained 12.289			
CC22	I trust the carsharing services I use.	0.882	0.818
CC24	The carsharing service is safe.	0.835	0.732
CC21	I trust the carsharing operating model.	0.803	0.745
Factor 4—Risks Cronbach alpha 0.687 Percentage of Variance Explained 10.365			
CC29	Having to find the car pick-up point is inconvenient.	0.773	0.645
CC28	Having to book the car every time I need to use it is inconvenient.	0.696	0.583
CC25	I'm afraid of not being able to use the shared car when I need to use it.	0.682	0.527
CC27	I fear the car will not be suitable for use (maintenance, cleaning) when I need to use it.	0.680	0.464

Table 4. Cont.

Code	Item	Factor Loading	Com. ¹
Factor 5—Convenience Cronbach alpha 0.686 Percentage of Variance Explained 9.900			
CC11	Using the shared car saves me time.	0.765	0.714
CC10	The possibility of using different models of vehicles, according to my need, is an attraction of carsharing.	0.754	0.654
CC12	I appreciate the convenience of using the shared car for my trips.	0.634	0.600
CC6	I appreciate not having to worry about collective transportation schedules (bus, subway, train, ferry, catamaran) for my trips.	0.525	0.546
Factor 6—Cost savings Cronbach alpha 0.856 Percentage of Variance Explained 9.379			
CC1	I use the carsharing service because, by doing so, I can cut my costs.	0.902	0.854
CC2	Participating in carsharing benefits me financially.	0.905	0.842

¹ Communalities.

5.2. Scale Validation

Being a procedure that does not involve statistical tests but instead depends on the subjective assessment of the researcher [40], content validity was established through a literature review combined with discussions with experts on the topic and thus met the methodological rigor used in the development and refinement of the scale.

To verify the construct validity and confirm the six-factor solution of the scale, we performed confirmatory factor analysis (CFA). This procedure can be considered preliminary, as the same data set was used for purification and validation. In this way, we estimated six measurement models; one for each dimension of the collaborative consumption scale. This method is widely used in marketing research to determine construct validity [41,42]. In particular, we assessed the unidimensionality, reliability, convergent validity, and discriminant validity, as well as the fit statistics described in the literature [39].

Table 5 shows the following fit indexes for the constructs of socio-environmental consciousness, social identity, trust, risks, and convenience; the chi-square index divided by degrees of freedom (χ^2/df), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), Tucker-Lewis index (TLI), comparative fit index (CFI), and root mean square error of approximation (RMSEA).

Table 5. Fit statistics for the constructs.

Fit Statistics	Socio-Environmental Consciousness	Social Identity	Trust	Risks	Convenience
χ^2/df	1.490	3.774	2.118	1.042	1.155
GFI	0.995	0.980	0.989	0.996	0.991
AGFI	0.928	0.879	0.931	0.958	0.953
TLI	0.986	0.959	0.981	0.997	0.989
CFI	0.999	0.986	0.994	1.000	0.996
RMSEA	0.063	0.150	0.095	0.018	0.035

Most of the fit indexes are acceptable. For example, most of the values of GFI, AGFI, TLI, and CFI were above the commonly recommended 0.9 limit [39,43]. Moreover, the RMSEA was less than the 0.08 cut-off value for the constructs of socio-environmental consciousness, risks, and convenience. For the trust and social identity dimensions, the RMSEA, and the AGFI for the latter, were outside the suggested range. Ullman [44] believes that the AGFI is equivalent to the GFI but is adjusted, considering the number of parameters in the adjusted model. The RMSEA index, on the other hand,

shares the same theoretical nature as the CFI, according to Raykov and Marcoulides [45]. Thus, due to the high CFI values obtained, the analyzed dimensions were considered validated. It should be noted that the existence of only two or three items in certain dimensions may explain the occurrence of improper statistics; hence the number of items should be reviewed in future studies.

Construct validation of the cost savings dimension was unfeasible due to the low conceptual explanatory capacity intrinsic to models with only two items [42]. However, considering its theoretical relevance to the studied phenomenon, related to its content validity, and its good performance in the exploratory phase of the study, it was decided to retain this construct in the scale so that its construct validation might be confirmed in future research.

Unidimensionality was achieved by examining the standardized residuals, which could indicate items with an unacceptable fit to the model [42,43]. According to the literature, for a dimension to be considered unidimensional, all its standardized residuals should be less than 2.58. The highest value found in this study was 0.692 in the convenience dimension. From this information, we can conclude that we found evidence of unidimensionality for our measurements.

The reliability tests used were intended to overcome the limitations associated with the Cronbach's alpha coefficients [42]. Thus, the composite reliability and variance extracted from all constructs values were calculated. Composite reliabilities were high, surpassing the recommended threshold level of 0.7. Whereas the variance extracted for the dimensions of socio-environmental consciousness, social identity, trust, and convenience exceeded the required 0.5, the variance extracted for risks fell slightly below the minimum level. This result suggests that there are opportunities for further item refinement in this construct. Given the exploratory nature of this study, the risks dimension can also be considered reliable. Table 6 presents the composite reliabilities and variance extracted for the dimensions, as well as their respective standardized factor loadings and t-values.

Table 6. Reliability and convergent validity.

Dimensions	Reliability		Convergent Validity	
	Composite Reliability	Variance Extracted	Standardized Loading ¹	T-Value ²
Socio-environmental consciousness	0.920	0.700	0.597	6.123
Social identity	0.930	0.810	0.684	8.835
Trust	0.920	0.790	0.749	8.939
Risks	0.720	0.400	0.434	3.157
Convenience	0.790	0.500	0.490	3.853

^{1,2} Lowest value on each factor.

Byrne [38] (p. 288) described convergent validity as 'the extent to which independent measures of the same trait are correlated'. Specifically, convergent validity is reflected in the magnitude of the standardized factor loadings and t-values for all constructs involved in the scale [41,42]. As shown in Table 6, two dimensions, risks and convenience, displayed items with factor loadings below the limit of 0.5. Again, this may occur in newly developed scales. T-values, however, were found to exceed the minimum level of 2.0, proposed by Bagozzi et al. [41]. Hence, the results support the convergent validity.

Finally, we examined the discriminant validity. According to Kline [39] (p. 72), 'a set of variables presumed to measure different constructs shows discriminant validity if their intercorrelations are not too high'. In testing for evidence of discriminant validity among the dimensions for the scale of collaborative consumption, we contrasted the squared correlation of each dimension pair with the variance extracted from each dimension, following the procedure described by Fornell and Larcker [46]. Discriminant validity is exhibited only if each variance extracted is larger than all correlations. In each case, the variance extracted (square root, the value in bold) exceeded the correlation, supporting discriminant validity (Table 7).

Table 7. Discriminant validity ¹.

	SEC ²	Trust	SI	CNV	Risks
SEC	0.84				
Trust	0.307	0.89			
SI	0.556	0.171	0.90		
CNV	0.291	0.357	0.375	0.71	
Risks	0.002	0.192	−0.135	−0.011	0.63

¹ For the correlations we calculated the mean of variable indicators. ² SEC: Socio-environmental consciousness; SI: Social identity; CNV: Convenience.

In summary, the results of the CFA support the scale's unidimensionality, reliability, convergent validity, and discriminant validity. Taken together, these tests confirm the validation process of the proposed scale for measuring the construct of collaborative consumption.

6. Discussion and Conclusions

Concerning the theoretical implications of this research, it is understood that the scale development and test fills a gap identified in the literature, providing greater theoretical understanding regarding the dimensions that compose the collaborative consumption construct. In this sense, this study provides an important contribution to the understanding of consumer behavior by identifying and offering insights into the composition of collaborative consumption applied to a carsharing setting.

The first strength of the research refers to the relevance of the purification process since only empirical evidence could prove that a few items were not part of the construct of collaborative consumption. Nevertheless, further item refinement might be needed, especially for the dimensions formed by two or three indicators like social identity, trust, and cost savings. Future studies might enhance the conceptual richness of the proposed dimensions and consequently offer a better representation of the construct.

It is important to note that through the scale's development and purification process, poorly loading items, and cross-loading items were removed from the factor analysis to achieve a better solution. Prior to EFA, the wording of the scale was adapted to improve the understandability of the items in each dimension. Therefore, the EFA results were submitted to content analysis to ensure that statistical results meet content criteria [40].

Another contribution relates to the verification and confirmation of the measures that compose the collaborative consumption construct through the CFA analysis. In this case, the findings indicate good results for the scale's unidimensionality, reliability, and convergent and discriminant validity. The fit statistics for the analyzed dimensions also show a reasonable level of model fit for a new scale, which supports the construct validity. This study was performed with a sample of real users, indicating the high external validity of the results.

Notwithstanding its potential contributions, the research has several limitations. The findings of the refinement process revealed reliable measures but with some unadjusted items and dimensions, which, therefore, deserve further evaluation. The cost savings dimension was not statistically validated due to the small number of items, but its relevance and adherence to the construct of collaborative consumption was proven in the exploratory stage. In this sense, this limitation should be overcome in future studies that must provide new measurement items for the cost savings dimension.

In addition, one must consider the limitations relative to the use of the same data set for purification and validation procedures, which proved necessary in this case due to the relatively small sample size that was impractical to split. For this reason, it is recommended that CFA is repeated in a fresh sample in the future with the new aforementioned measurement items. The profile and size of the population used in this study in Brazil, as well as the limited availability of the database, make it difficult both to replicate the study and also to compare the respondent profile with that of the non-respondents. Moreover, performing a survey among users and non-users of the carsharing services would be an interesting avenue for further research.

Another limitation refers to the application of the survey related to carsharing users in one Brazilian metropolis. In this sense, to ensure a highly generalizable scale, future studies could investigate the applicability of the dimensions of collaborative consumption in different national and cultural contexts.

Kang et al. [12] argue that, particularly in American cities, carsharing is expected to be associated with high-density areas, where privately owned vehicles should be less present. In addition, carsharing is also offered jointly with other public transportation solutions such as trains and subways in such areas. When we compare São Paulo, where this study took place, to another metropolis abroad, it has a poor public transportation system, with only five subway lines and insufficient buses to meet the needs of the population. Many people who can afford a car buy one in order to better provide for their transportation needs, but parking is expensive in central areas, which can be a constraint for carsharing systems as well. In this sense, while this study sheds new light on the little studied areas of collaborative consumption and the carsharing market, it also confirms the need for replication in other locations.

The fact that it is context specific may also be a weakness of this study, although it provides important avenues for future research in order to provide generalizability for the proposed scale. While largely based on collaborative consumption theory, in order to be feasible to be applied in the carsharing setting as an example of collaborative consumption, the proposed scale suffered from the need for item specificity in some of the theoretical dimensions studied. Scale items such as 'I fear the car will not be suitable for use (maintenance, cleaning) when I need to use it' from the risks dimension and 'I appreciate the convenience of using the shared car for my trips' and 'I appreciate not having to worry about collective transportation schedules (bus, subway, train, ferry, catamaran) for my trips' from the convenience dimension should suffer major changes when applying the proposed scale to other kinds of collaborative consumption settings. Thus, adapting and applying the proposed scale in other collaborative consumption platforms and contexts, such as accommodation, tourism, clothing, and others, would offer the opportunity to validate the scale in a broader spectrum of collaborative consumption needs.

The examination of a model that includes antecedents and consequences of the construct is also recommended to provide a more comprehensive picture of consumer behavior and to generate a better understanding of how the dimensions of the collaborative consumption concept are affected and affect other constructs. In a study performed in Germany by Möhlmann [15], trust appeared as an antecedent for satisfaction in a carsharing system, and community belonging/identity was a relevant predictor for choosing the sharing option again. Future studies with this proposed scale can test a theoretical model and verify the role of trust as a facilitator for collaborative consumption.

The alternative pattern of consumption, motivated by emotional, rational, or utilitarian issues, demonstrates that obtaining the acceptance, adoption, and diffusion of collaborative forms of businesses among consumers constitutes a great managerial challenge. According to the results, convenience of use, sense of belonging to a community, greater social and sustainable awareness, trust in strangers, and preference for accessibility rather than ownership are the main drivers of collaborative consumption. More rational and utilitarian aspects, such as cost savings, are equally important variables that need to be explored by companies when creating, communicating, and disseminating new collaborative practices. We must also mention that the proposed scale is built for people already engaged in collaborative consumption, otherwise he/she could not feel social identity, perceive risks and costs, and so on. With the scale dimensions and a profile identification, a manager can certainly identify the kind of person most involved in collaborative consumption among those already engaged in this sort of platform.

Using this scale in different platforms of collaborative consumption (with minor adjustments for each platform) one can measure the strength of the motivators and the impact of the constraints consumers feel when engaging in such collaborative platforms, as well as the facilitating role of trust in this mode of consumption. If the motivators are high, continued use of the collaborative consumption platform analyzed would be a logical future intention. On the other hand, if constraints are higher, the probability of abandoning collaborative consumption must be considered. Based on these answers, obtained through research scores from the collaborative consumption scale, companies

can better provide offers to their consumers, increasing the practice of collaborative consumption while reducing the perception of risk and supporting motivations. Hence, we suggest that future studies test the predictive validity of the proposed scale by applying it in different samples and collaborative consumption contexts. Taking all this into account, the proposed scale can be considered to have only been preliminarily validated; hence future studies are encouraged to replicate it and improve upon it.

The results of this paper also offer important insights that can be considered by managers seeking to adapt their business activities to build a sense of community belonging and trust, strategically competitive advantages in a market in which the acquisition and retention of customers have high relevance. Finally, a more accurate understanding of the nature and impact of shared activities and the potential growth of the carsharing market offers collaborative consumption opportunities like the development of new business propositions with less environmental impact and more meaningful experiences for users. Governments could also use these insights to promote collaborative consumption, especially in big cities. Identifying personal characteristics that relate to shared consumption, therefore, is critical for companies that want to win new consumers, even if this involves initially appealing to a limited number of individuals who share beliefs and motivations that are distinct from those held by the majority.

This study also offers managers a better understanding of user profiles, congruent with prior research. In this study, as in previous ones, males reported using carsharing more often than females (see Kang et al. for a revision) [12]. Usage for leisure purposes and daily activities such as shopping also showed congruence with earlier studies [13]. In sum, consumer behavior relative to collaborative consumption is a research focus with potential impacts for scholars, managers, and governments.

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