

Article

Consumer Perception of Online Attributes in Circular Economy Activities

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Received: 31 December 2019; Accepted: 21 February 2020; Published: 3 March 2020



Abstract: Businesses like Airbnb have shown that a successful circular economy (CE) business can operate exclusively online. Although online communication and web appearance attributes have been subject to academic research given accelerated digitization, there is still a lack of knowledge about online attributes and their role in facilitating CE. We close the portrayed knowledge gap by conducting a discrete-choice experiment with best to worst scaling and focusing on the effect of CE experience on the perception of a CE website by ranking nine online attributes, grouped in three subsets. We therefore contribute by identifying online attributes that are perceived as favorable for CE businesses and detect how participation in CE activities affects the perception of these attributes. We find that third-party associated online attributes (e.g., user reviews or third-party guarantees) rank significantly higher throughout CE consumption patterns of the sample, being always amongst the top three attributes. This novel finding on online preferences opens a new direction for further research, as well as allows practitioners to optimize online operations accordingly. Furthermore, we find that users without prior touchpoints with CE have a higher need for information about the business model as compared to CE active users who are more interested in community related attributes.

Keywords: circular economy; perception; online preferences; consumer engagement

1. Introduction

The growing field of circular economy is expanding to new research directions. Studies focused on the policy, business, economic and environmental aspects of such transitions and giving an overview of the state of art on a macro, meso and micro level [1]. Today, as a growing number of businesses adopt CE and circular systems approach, there is a need to further study the micromanagement aspects of such a transition. In their review on CE, Ghiselli et al. [1] reveal that implementation at the micro level (single company or consumer) is particularly understudied in the fields of green consumption and recycle and reuse. Referring to Ramani et al. [2], the scholars identify a need for future research addressing consumer choices to support stakeholders in matching consumer needs. In this context, the evolution of information technologies and the internet as a major communication channel appear as a game changer, allowing for new ways of information exchange with customers [3]. This includes opportunities significantly simplifying processes, e.g., the order process where previously one had to call companies and recite incredibly long product numbers to place an order. In addition to facilitated order processes, information transfer has been affected by digitization as well. With the aid of the internet, companies can find ways to address heterogeneous customers' needs for information on different levels. They can precisely adjust the amount and kind of information, as well as determine

how interactive the communication with customers shall be. Furthermore, the internet facilitates the management of information accessibility, timeliness and display at comparatively low cost [3,4]. Yet, as in every relationship as time passes, we have reached a point where digitization may have rendered the relationship between customers and company more complex. Customers are more aware and interested in processes than ever before. In particular, data on social and ecological responsibility are increasingly of interest and might affect customer behavior. While positive information leverages customer attitude towards the company, an absence of it might have the opposite effect [5]. The new and enhanced role of customers presents substantial challenges for companies [6]. The high degree of customer involvement may complicate operations and, yet, seems to be necessary to maintain competitiveness.

Various studies researched the impact of online store attributes and website characteristics on customer satisfaction and overall financial performance. Inter alia, website attributes, like quality of system architecture and quality of content, are shown to have an impact on consumer online satisfaction (see, for example, [7]). Although these studies revealed the influence of certain online attributes on a company's web presence, they fail to acknowledge a ranking of these factors and, thus, fail to uncover potential for optimization. Jin et al. [8] have been among the first aiming to close this apparent knowledge gap by studying marketing and basic online attributes and assuming different levels of impact. One of their findings is that marketing-related online attributes have significant influence on online satisfaction, while other attributes do not. Furthermore, their work emphasizes the difficulty of achieving loyalty online, since no transfer of offline to online loyalty occurs. However, further insights on an actual ranking of online attributes remain untapped. To the best of our knowledge, neither are these questions studied in the context of sustainability and, specifically, circular economy-related businesses. We know consumers have preferences in online attributes, with first, scholars, to study a ranking of these. However, we do not know if these preferences remain the same, switching from linear offers to circular alternatives. The ensuing research questions are apparent: What are consumer online preferences in the context of CE businesses? Do they change? If so, how can managers and entrepreneurs make use of this knowledge to grow their CE-related business?

Considering the recent interest in business models adhering to circular economy (CE) principles which aim to foster a more resource-efficient consumption pattern at a larger scale, indications in which online attributes can foster participation are missing and would be extremely valuable. CE comprises several sustainability-focused activities under one roof and often goes hand in hand with the innovation of a business model. If reaching critical mass, a consequent disruption of an industry can happen, as in the example of Airbnb and the travel/hotel industry. Sticking with this example, Airbnb does not have assets but is mediating supply and demand via their online platform. A lot of CE-based businesses are operating in this manner and, in consequence, are operating solely online. Hence, knowledge about most helpful online attributes of a website based on CE principles can be a crucial drive for their success.

In order to close this knowledge gap, we are studying online attributes in relation to participation in four CE activities, namely: recycling, upcycling, renting and sharing. These activities will be viewed from the perspective of their consumer-centered aspects and not technical features. This means, for example, that technical features of recycling will be neglected. Thus, our research is focused on consumer-centered activities and sectors, making it applicable to a multitude of companies and industries. This study assesses which online attributes have the biggest importance by ranking the nine chosen online attributes and clusters based on participation in CE. The aim is to reveal attributes of relevance in evaluating the website of a CE business with regard to prior experience with consumer-centered CE activities. Our goal is to identify online attributes that are perceived as favorable for CE businesses and to detect how participation in CE activities affects the perception of these attributes.

The remainder of this paper is structured as follows: in Section 2, we review the pertinent literature. In Section 3, we describe our method and data. In Section 4, we present our results, with following discussion in Section 5. We end with conclusions and future research outlook in Section 6.

2. Literature Review

As described in the introduction, there are online attributes consumers prefer, while others remain irrelevant. Taking a step back, this assessment of different attributes roots in the two-factor theory of Herzberg [9]. While various scholars have advanced the initial model—ranging from the KANO model offering four classes of factors [10] to the Chitari et al. hedonic versus utilitarian perspective [11]—the main premise remains as in the original work. Herzberg states that hygiene factors are attributes whose absence can result in dissatisfaction but whose presence does not add to the overall satisfaction [9]. However, there are motivational factors that do increase satisfaction while their absence does not result in immediate dissatisfaction. Referring to our study setup in the context of digital operations, scholars revealed that convenience of website handling, overall usability, data and privacy confidentiality and credibility can be considered hygiene factors in online environments [12]. By contrast, they find motivation factors, i.e., factors whose presence adds to overall satisfaction, to be quality of content and user experience on the website. Jin et al. [8] based their study also around Herzberg's two-factor theory, demonstrating a different level of impact of different online attributes.

Different aspects play into consumer satisfaction and are currently transferred to a digital context. Another study supported these initial findings and emphasized the reliability of information as an important hygiene factor [7]. Especially communication has been found to be a driver for customer satisfaction [13]. One particularly important aspect in customer communication is the portraying of the corporate's current position and activities on ethics, environmental and social issues [14]. Furthermore, literature observed that, in some cases, digital communication can lead to even more intimate exchanges (e.g., [15]). A study on Airbnb users revealed that users tend to convey a personal touch by using personal names in the comment section [16].

Instant messengers and/or chatbots have been established as an industry-overarching trend to ensure timely communication with the user and, thus, can be considered a digital mechanism covering aspects of f2f interaction, immediacy of communication and reaction [17]. With regard to communication being a driver for customer satisfaction, channels allowing for exchange between the company and its consumers can be considered motivational factors. A high activity on social media channels (SM) addresses another aspect of f2f interaction. Depending on the published content, a perceived proximity between the company and users/potential customers can be established. Recent studies indicate that users can even improve their perception of a company's reputation when reading comments online as compared to the news, making a comment section a valuable interaction tool for practitioners [18].

The relevance of SM can be particularly well-observed in cases of personal branding (e.g., celebrities and influencers) where users feel "close" and "as if they know" the individual they are following. This supports matching the online celebrity with products fitting their personality and perceived values [19]. Another level of identification is achieved through presentation of the team. This online attribute shows the people behind a specific product and/or service and illustrates their motives to work for the company. This gives users the perception of having and recognizing a contact person in case of questions or the like.

The display of "impact on sustainability" usually aims at an emotional attachment with the company brand and offering as basing on pleasing three features of the self: self-gratification, self-enrichment and self-enabling (see [20]). Thus, users are prone to improve their self-image through using offerings of a company communicating their sustainability impact and feel as more integral individuals [21]. Sen and Bhattacharya support the notion that corporate social responsibility (CSR) activities can reinforce an individual's desire for self-enhancement [22]. Although consumers might not donate to charity or be particularly interested in sustainable consumption, they can easily address a subconscious desire to support a good cause by purchasing products/services of a company active in CSR [23].

Literature suggests that user reviews have become increasingly powerful in a variety of product and service categories (e.g., [24]). The average rating provides consumers with quick information on a product/service quality, as well as influences their expectation and purchase decision [25,26].

Next to user reviews, the offer of a guarantee or warranty can influence purchase decision behavior by indicating not only a certain quality standard but also leveraging the relationship between consumers and company [27–29]. Although sometimes guarantees such as "service quality promises" are voluntarily communicated, they tend to be regulated by policies and laws [30]. In consequence, the users can be sure that the information of a guarantee or warranty is linked to a third-party approval and control. Third-party certification initiatives in e-commerce have enhanced consumer confidence and boosted sales [31]. Third-party certifiers are private or public committees who evaluate and certify assertions based on a specified set of standards [32]. As providing assurance about the product and/or service, certification can reduce uncertainties and even decrease overall transaction costs that arise from information asymmetries [32,33]. Similar to guarantees or warranties, third-party certification is one method to display a firm's compliance with standards, values and sometimes also legal requirements, especially when certification is a voluntary evaluation [34].

In the context of e-commerce purchases, certifications also significantly increase purchasing prospects due to reduced perceived risk [35]. These findings are supported by various scholars, suggesting that third-party certification is an effective tool in trust creation. Luo [36] suggested that third-party certification serves as the creation of trust between the e-vendor and consumers. Although a potential customer may possibly lack their own experience with a company, a third-party logo symbolizes relevant and positive information about a company. Miyazaki and Krishnamurthy [31] state that these logos denote "values, behavioral intentions, adherence to specific policies or certification standards, technical capabilities, or even satisfaction of prior customers". Sønderskov and Daugbjerg go one step further, implying governmental involvement in certification as a relevant aspect to increase consumer trust towards these tools [37].

This overview shows that there are already tools and measures in place that can be divided into hygiene and motivational factors and placed into a digital context. While most information in our current economic setup have trickled down to the consumer, making him/her aware of potential pitfalls of linear consumption processes, this is not yet the case for CE offerings. Consumers are in need of information to assess benefits and potential risks of CE offers, making close communication between the company and consumer crucial for a successful practice [38].

However, we do not make our choices in a vacuum. They are based—consciously or subconsciously—on an assessment of the alternatives, expected risks and rewards [39]. These factors can be especially relevant when considering participation in a different kind of business model or innovation.

Since our choices and preferences are relative to other options, an individual assessment of a singular online attribute with regard to CE is flawed. Alternatives are needed to determine the most helpful attributes, i.e., the ones resources should be allocated to first. Based on these insights and in order to assess the most beneficial online attributes in CE activities, we conduct a discrete choice experiment with best-worst scaling. In accordance with the Ellen MacArthur Foundation [40], the underlying study focuses on consumer-centric CE activities. Our methodology is elaborated in detail in the following section.

3. Method and Data

Discrete choice model (DCM) is a research method that derives information about the decision-maker via hypothetical situations. Contrary to revealed preferences, i.e., in the form of company data or real-life market tests, participants of a DCM have to make decisions amongst alternatives in a theoretical context. In particular, DCMs with best-worst scaling (BWS) have been featured more and more in academic research due to their high flexibility. Inter alia, BWS has been featured studying marketing activities (e.g., [41]), health care topics (e.g., [42]) and willingness-to-pay (e.g., [43]), as well as evaluating hypothetical attributes of advertisement (e.g., [44]). The latter served as a conceptual analogy for the underlying research design, as we are also studying attributes of a hypothetical website. Finn and Louviere introduced in 1992 BWS as a subcategory of DCM by [45]. The

scholars establish BWS as modeling "the cognitive process by which respondents repeatedly choose the two objects in varying sets of three or more objects that they feel exhibit the largest perceptual difference on an underlying continuum of interest" [45]. In other words, respondents were confronted with a set of attributes and chose their least and most preferred answer. While there have been conjoint analyses in the context of consumer behavior and preference in CE (e.g., [46]), to the best of our knowledge, the above methods were not used before in the context of online studies to better understand consumer preferences in circular economy-related activities.

In the underlying study, the hypothetical context is the website of a CE business, i.e., a business either associated with recycling, upcycling, sharing or renting activities. There was no explicit priming on what kind of CE activity has to be chosen in the imaginative context. In this study, we used DCM and BWS methods, considering that we aim to reveal factors influencing the final ranking, e.g., educational background, general attitude towards off- and online purchasing and demographic situation. Another perk of this research method is the possibility to apply BWS to more than seven attributes as compared to other preference measures, e.g., ranking methods where more than seven attributes affect accuracy and consistency of results [47]. Results of a BWS offer a higher degree of discrimination [48]. Indirect comparison BWS out-classed other methods, displaying not only the highest discrimination but, also, predictive power. Furthermore, Hinz et al. [49] promote BWS as a fit for studies with heterogeneous backgrounds in terms of, e.g., education or even culture, due to the high consistency of interpretation across respondents. This is expected to achieve more realistic results than verbal scales (e.g., Likert), because there is no need for a transfer of their preferences into an artificial concept. The binary assessment is intuitive and comparable to real-life purchase decisions, which renders the BWS an indicator for actual customer behavior [50].

We use the balanced incomplete block design (BIBD). BIBD allows for each comparison to comprise the same number of items and for it to appear equally often with other items. Yet, only a few BIBDs have maximized symmetry—a BIBD of 9 items is one of these best practices [51]. Given the limited attention span of consumers, we decided to study not more than 10 items to keep complexity at bay. The only other favorable BIBD below 10 would be 7, making an equal distribution of three subcategories impossible; i.e., the underrepresentation of one category could lead to biased results. Since we rank nine attributes, other ranking methods would not lead to similar methodologically solid results as BWS.

Given the state of literature, our experiment focuses on online attributes that are currently in vogue (e.g., chatbots, social media integration, etc.). We also used credibility-enhancing factors such as third-party certification in order to assess their overall importance for users in the context of CE. We observe whether differences in ranking occur if focusing on different demographic subclusters and different states of participation in CE activities. The observed online attributes were divided into three subgroups. The first subgroup tries to simulate face-to-face interaction digitally. This kind of information is company-issued but adaptive and flexible; i.e., it does react to individual users or, in terms of social media, gives individual users the impression to be part of live events (e.g., Instastories and Snapchat). The second subgroup of attributes is company-issued rigid information, i.e., fixed information pieces/categories on the company website. This cluster comprises an explanation of the business model and its specific perks in order for the user to gain an understanding of the product and/or service and its advantages over linear alternatives. Besides, a "loud brand" has been included into the choice set. While brand prominence generally depends on the degree to which a product has visible markings that help ensure observers recognize the brand" [52], a loud product is directly recognizable due to its noticeable branding, e.g., logo, design theme or color. This way a company can decide how openly and prominently it wants to display its brand, both on as well as offline. In terms of a loud brand online, the prominence of a logo, overall coherence of design and high recognition value are assumed to show professionalism and a high quality of the respective company offerings. Last, the company can decide to which degree it displays its impact on sustainability. The third subgroup of online attributes introduces third-party information. While the company develops and decides on how

far corporate social responsibility (CSR), brand and business model are depicted on the website, the following features are externally issued. The first attribute are user reviews with the common star and text rating.

Table 1 depicts an overview of all nine online attributes. These short explanations were displayed throughout the discrete choice experiment, given that the respective attribute was part of the current choice set. This aimed at a consistent understanding of the attributes and, thus, a minimization of survey errors.

Table 1. Overview and explanation of observed online attributes.

Attribute Short Name	Explanation
Company-issued flexible attributes	
Instant chat/chatbot	Instant communication tool for communication with company. Possibility to reach company representatives in case questions or problems with product/service occur.
Team presentation	Meet the team. This section of the website describes motivation, philosophy and shows the people behind the curtain
Community on social media	Social media channels are linked to the webpage, e.g., in the form of the last Instagram mentions of the company or number of Facebook likes.
Company-issued rigid attributes	
Loud brand	Recognizable branding (logo, font and design). Branding is prominent on website.
Explanation of business model	A dedicated section on the website that explains what is special about the business and how it adheres to circular economy (CE) principles. Processes are illustrated to facilitate understanding and delineation from linear alternatives.
Impact on sustainability	Section of the website that explains how CE has an effect on overall sustainability. Shows explicitly, e.g., in form of data, how much waste has been avoided or how much of a resource have been reused by the company.
Third-party associated attributes	
Guarantee/warranty	A certain level of service/product quality is promised by explicit company claim. If the product is new, yet a sustainably produced warranty is offered. The promise is backed by legislation.
User reviews	Reviews of prior customers with the common “text and star” layout for each product/service.
Third-party certification	A third-party certification assesses the company and its processes. It confirms claims of CE and sustainability are true and approved.

In order to achieve the optimal experimental design, several premises have to be fulfilled, according to Lee et al. [48]. First, each studied attribute has to appear an equal number of times within the survey questionnaire in order to avoid overrepresentation and, thus, biased results. Second, the combination of items has to be balanced to avoid contextual effects. Third, each choice set has to have an equal number of attributes, with the minimum being three. This structure prevents bias through interpretation by and confusion of the survey respondent.

Our experiment was implemented using the online platform DISE [53]. DISE allows for using a balanced incomplete block design (BIBD). A BIBD fulfills all before-mentioned criteria for ideal experimental design, resulting in each of the nine online attributes appearing four times with a pair frequency of one, resulting in, overall, twelve choice sets with three attributes in our BWS. A randomizer has been integrated in the DISE questionnaire in order to control for possible order effects.

Overall, the questionnaire comprised five sections: (1) short introduction with briefing, (2) BWS choice sets with a definition of each displayed attribute, (3) additional attributes to indicate tendencies, (4) questions about online and offline consumption (Likert-scaled) and (5) demographic and socio-economic questions. While the additional questions (Sections 3 and 4) serve as indications for future research topics, the primary focus of this study lies on the BWS of the nine chosen attributes

and the understanding of customers preferences in digital operations (see an example of the screen in Appendix A).

The results of the BWS are deducted by subtracting the number an attribute has been worst from the number it has been considered best. According to Marley and Louviere [54], this easy calculation results in a close approximation of the respective multinomial logit results. In addition, according to Cheung et al. [55], this analysis is the most common evaluation method of BWS experiments. To sum up, the beforehand introduced nine attributes of the online shops were ranked via a DCM with BWS in order to prioritize implementation for practitioners. This way, we are able to observe which attributes are more important and whether there are specific overarching topics that foster customer acquisition.

In our study, respondents have received the briefing that recycling is considered a usage of product components, while upcycling is the re-using of the product as a whole. Sharing was defined as a peer-to-peer interaction, while renting involves a third party, i.e., a company who has ownership of the products or services. Respondents were asked to indicate their participation in these CE-adhering activities. Furthermore, they have to imagine the website they are evaluating to be a CE-based business. A pre-testing showed that respondents were confidently differentiating these participation modes and thinking of possible CE businesses and websites, making the priming sufficient. Since the actual type of CE activity is irrelevant to our analysis, the common method variance is negligible, making further tests redundant. We collected the data via an online survey developed with the software DISE. All incomplete questionnaires, as well as questionnaires answered by minors, have been omitted from the sample. In total, 99 fully answered and adequate best-worst sections have been acquired between May to June 2017. This resulted in, overall, 1188 choices made as each of the respondents has been confronted with 12 choice sets. However, only 97 people agreed to share their CE activities; therefore, the two best-worst sections of these respondents were not included in the compared rankings. The sample size is satisfactory and the best practice, referring to an overview of sample sizes in DCMs in health by De Bekker-Grob et al. [56]. Their research revealed a third of DCMs has a sample size of $n < 100$.

Figure 1 illustrates the demographics of the respondents in terms of age and gender. Fifty-four percent of respondents are male and 43 percent are female (remaining 3% diverse), thus, almost equal to the balanced gender distribution in Germany [57]. Referring to age, an age sand clock similar to the overall German population can be observed. Yet, the majority of respondents are between 18 and 25 years old, amounting to 55 percent of respondents. Only 9 percent of respondents are above 50 years old. This is likely due to limited access to the internet in the older population and, in consequence, the online survey. However, this does not imply that older people do not participate in CE activities. Occupation and the highest level of education suggested that majority of respondents are still students, which explained the sample's slight bias in age structure. Over 70 percent of respondents have an academic degree, which furthermore matches the whole German population [58]. Twenty-nine respondents indicated to not participate in any activity affiliated with CE; i.e., they did not participate in any recycling, upcycling, renting or sharing activities. This amounts to almost a third of respondents. The nonparticipants comprise 59 percent male and respectively 41 percent female respondents. Almost two-third of respondents revealed participation in a minimum of one CE activity. Age and education structures appear to be neglectable factors observing CE activities of this sample, since no distribution pattern can be detected.

Our study is innovative in being the first to conduct a BWS in the context of consumer perception of online attributes in the context of CE business models. Further, we study nine online attributes we divided in three self-developed subsets. These subsets are especially valuable for practitioners, as indicating the scope of action.

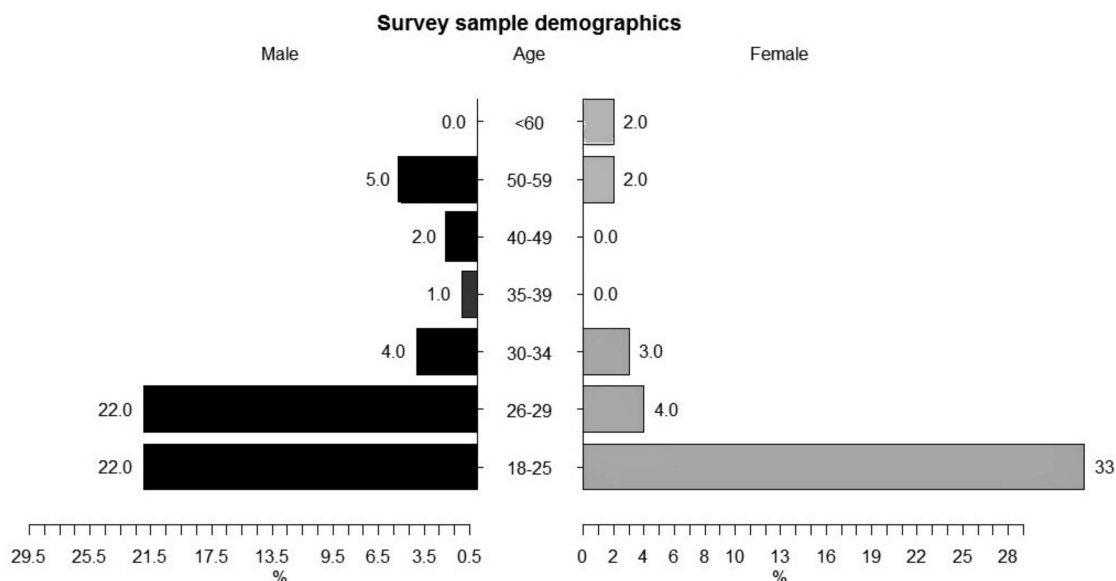


Figure 1. Overview survey demographics.

4. Results

The ranking results show that user reviews (100) and guarantee/warranty (88) score both high and are the most and second-most helpful online attributes, respectively. Table 2 shows the absolute score (times named best minus times named worst), as well as standardized and weighted scores. The explanation of the business model (66) third-party certification (63) are important as well. Impact on sustainability (55) was rated moderately high. On the other hand, a high activity on social media (36), instant chat/chatbot (33) and the presentation of the team (32) were rated low. A loud brand is ranked lowest (29), indicating that these attributes have little significance in the evaluation process of a website of a CE-adhering business. Less important attributes are interpreted as the ratio relative to the most important attribute. Consequently, this does not mean that lower ranked attributes are not helpful at all but only in comparison to the other attributes [59].

Table 2. Results and ranking of discrete choice model with best-worst-scaling.

Rank	Item	(B-W) Score	SQRT (Square Root Ratio Most-to-Least Counts)	Std Score	Std Weight (%)
1	User reviews	147	1.97	100	20
2	Guarantee/warranty	137	1.73	88	18
3	Explanation of business model	71	1.29	66	13
4	Third-party certification	57	1.25	63	13
5	Impact on sustainability	20	1.08	55	11
6	Activity on social media	(80)	0.71	36	7
7	Instant chat/chatbot	(102)	0.65	33	7
8	Team presentation	(119)	0.64	32	6
9	Loud brand	(131)	0.57	29	6

Figure 2 illustrates the standardized ranking in decreasing order of the three subgroups of attributes: company-issued flexible (grey), company-issued rigid (green) and third-party information (black) and which subgroup of attributes plays a more important role. It can be seen that, in the overall ranking, the online attributes associated with third-party information are especially well-ranked. User reviews (top rank), guarantee/warranty (2nd place) and third-party certification (4th place) are all in the first half of the ranking results, scoring in sum higher than both other subgroups. All online attributes in this group yield a combined best-worst (B-W) score of 341, as compared to -40 and -301 for the

combined ranking results for company-issued rigid and flexible attributes, respectively. Comparing the overall ranking with the rankings focusing on participation intensity, it can be seen that there are differences. Respondents who are participating in all listed CE activities, i.e., in recycling, upcycling, renting and sharing, support the notion that user reviews are the most helpful online feature of a web presence. However, they consider a prominent branding more important than the overall sample, ranking a loud brand moderately high (6th place).

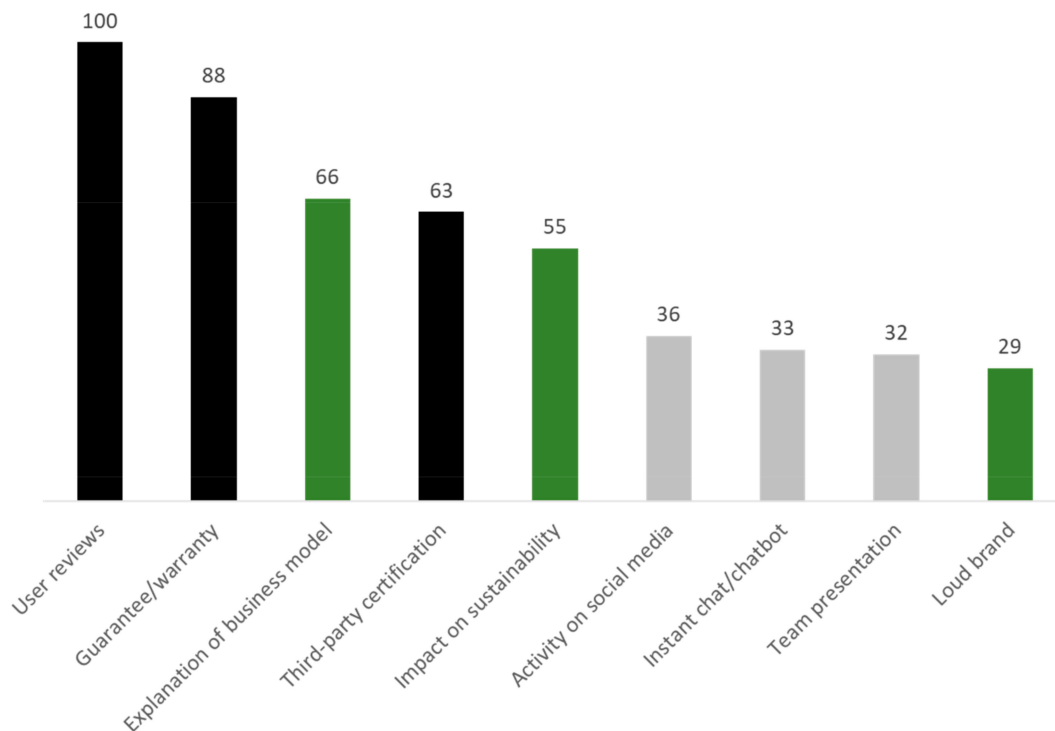


Figure 2. Results clustered in company-issued flexible (grey), company-issued rigid (green) and third-party associated (black) attributes. Standardized score.

Table 3 compares the overall ranking with the ranking of respondents who participate in (1) all CE activities, (2) at least three CE activities and (3) do not participate in CE activities at all. The ranking illustrates that, although differences in ranking are observable, the three online attributes associated with third-party information consistently score amongst the highest attributes. Thus, it can be concluded that these attributes have the highest importance and are the most helpful for users evaluating a web presence. The results show a high importance of third-party associated online attributes for consumers. Throughout all participation modes in CE activities, at least one of the online attributes user reviews, third-party certification and guarantee/warranty scored amongst the top three. This shows the importance of objective assurance for consumers when confronted with an offering that diverges from standard procedure. The high significance of third-party-associated information leads to the perception that the company by itself has only limited power over the consumers’ perception of its trustworthiness and quality standard. Third-party-associated information is necessary to achieve the most helpful website design for purchase evaluations. The high ranking of user reviews shows the importance of social proof and authentic information on product and/or service.

Table 3. Results and ranking of discrete choice model with best-worst scaling.

Item	Overall Rank	Participation in CE Activities		
		All	At least 3	None
User reviews	1	1	1	2
Guarantee/warranty	2	2	2	1
Explanation of business model	3	8	4	3
Third-party certification	4	3	3	4
Impact on sustainability	5	4	6	7
Activity on social media	6	4	6	7
Instant chat/chatbot	7	7	7	5
Team presentation	8	8	8	8
Loud brand	9	6	8	9
n (number of respondents participating in CE)		3	18	29

5. Discussion

Our results offer various managerial and practical implications. Companies can direct existing customers into marketing and sales channels and motivate customers with positive reviews to deliver user-generated content for social media. This would give a more personal and transparent touch to the respective company while indicating social proof through someone's loyalty towards product and/or service for new customers. This measure could probably be used across all social media channels, as well as be a core aspect in commercials and performance marketing (for example, in the form of banners featuring testimonials). Consequently, instead of fabricating content, a company can leverage its existing customers and use their loyalty and engagement to leverage credibility and service perception in addition to featured user reviews. Only satisfied customers would agree to represent a product or service, resulting in an intuitively positive connotation. Hence, the positive result of user reviews is advised to be transferred to company-controlled and low-scoring online features as social media channels. It is advised to actively integrate customers into the social media content generation. This suggestion is supported by Gounaris and Venetis [60], who suggest that service quality and customer bonding are antecedents of trust. Both of these aspects can be focused and fostered by integrating real consumers and their stories into marketing channels.

While these findings hold true also in a non-CE context, most consumers might not be aware of the advantages of CE business models and, thus, need to be educated even more about CE mechanisms through various marketing channels. Information has to be consistent with company values and, therefore, support the overall credibility of the company. Second, expectations are automatically managed through real customer feedback used in marketing. Third, by remaining true to customer feedback, i.e., in terms of actual user reviews, and using it combined with important information, a social proof is established. This serves an overall decreased risk perception. In the context of CE, trust and decreased risk perception are of particular importance as an integral part of the business model, e.g., renting a room at a stranger's house or driving with a stranger requires a certain level of trust. As a consequence, it is especially vital for CE businesses to integrate the user more into marketing activities and to incentivize more user reviews. Referring to literature, the number and valence of user reviews can positively influence customer decision processes. A large volume of user reviews results in higher attention for a specific product and/or service and, hence, increases the probability of a purchase [61]. Moreover, Ghose et al. [62] attributed a positive impact on user choice to the valence of user reviews. According to Goes et al. [63], online interactions with the user can result in an increasing number of reviews as well, supporting the beforehand mentioned cross-channel interaction. Thus, managers are well-advised to encourage users to review their products and services in order to increase the positive effects of the online attribute user reviews.

Another major implication can be derived from the ranking of a third-party certification. According to Busch et al. [64], credibility of a third-party certification requires a high level of objectiveness and

independence of the certifying initiative. Jiang et al. [65] indicate that the sheer exposure to certification logos is influential in purchase decisions in e-commerce. In the case of CE business, various certifications exist, but no exclusive certification for CE businesses exists to date. Hence, customers connote approval and high-quality standards with third-party certification. We therefore recommend to consider an industry-overarching certification developed by practitioners and scholars to increase information transfer in and attention for CE businesses, as well as adapt a quality standard. The corresponding committee should comprise CE company representatives, scholars, institutional representatives, etc. to ensure objectivity and, thus, increase the validity of the certification [64]. In addition, partners like the Ellen MacArthur Foundation, a think tank specializing in CE, can promote the certification and boost credibility and expertise. In order to develop a universal set of evaluation criteria, CE has to be defined more clearly. The development of appropriate evaluation criteria requires intensive work and re-work. Thus, while leveraging user reviews, integrating user content in social media are short and medium-term measures; the development of a third-party certification is suggested as a long-term measure.

Furthermore, the results show that ranking differences between respondents with prior CE experience and respondents without CE experience exist. Respondents without prior CE touchpoints rank explanations of business models and respective benefits of CE activities higher than respondents who are highly active in CE and participate in all four activities. The latter are more interested in explicit information on how the company positively impacts sustainability. The respondents also rank a loud brand and activity on social media as more important, implying an increasing focus on communities with increased activities in CE. Respondents with a high exposure to CE rank the explanation of the business model and its benefits according to CE principles less positively, indicating that this information is less important when the overarching mindset is already established. These findings are especially relevant for practitioners, as they indicate that, for customer acquisition in target groups without CE experience, more information on business models should be displayed as compared to a focus on community and branding with a CE savvy target group. These findings are recommended to be further researched with a larger sample of respondents who participate in all CE participation modes and, preferably, in a supervised experiment with, e.g., simulation or usage of a website.

Overall, it is important to conclude that the results of the experiment show great potential for companies that are considering optimization of their web presence. The ranking helps to prioritize measures and funds. Yet, while online attributes linked to third-party-associated information ranked higher in the experiment, this does not mean that other attributes should be completely neglected. The ranking is relative; thus, all attributes can be important, and the results should be interpreted accordingly. Another key finding is that the higher the respondent's exposure to CE, the less relevant they consider explanations of the business model and benefits in comparison to linear consumption. Hence, managers and entrepreneurs introducing CE products and services are advised to address the CE background of their target audience in order to optimally foster participation and respectively boost revenues.

Our study further contributes to the field of study related to CE and consumers. Given we conduct the first BWS for online attributes in the context of CE activities, our results are prime insights into consumer engagement in CE and, in particular, the effect of digital tools on consumer activation. Addressing the knowledge gap other scholars illustrated [1], we add knowledge to the understudied field of the implementation of CE activities on a micro level.

One limitation of our work is the limited number of attributes studied. While we are confident that our choice of attributes is relevant, it is only a fraction of potential attributes that are used in online operations and, therefore, ranked in relative comparison. Especially, considering the fast pace of technological innovation, it is possible that there are even more relevant attributes to support a transition to CE. Second, the study was general on several CE activities and not on specific aspects of specific CE activities. It could be that recycling activities online (like applying for a free shipping label

to return your old phone) might be very different than reserving a place with Airbnb, and therefore, the attributes rankings might change.

6. Conclusions and Future Research

Our study demonstrates the importance of different online attributes in order to better engage consumers in online activities related to circular economy activities such as recycling, reuse or sharing of products. Although some of our findings might hold for any product, we think that it is especially important to test such preferences in the context of promoting CE activities, as the use of the internet and IT platforms to promote such behavior is rapidly increasing.

Our work contributes to the emerging field of CE by providing a survey setup that researchers and practitioners can adopt to expand knowledge of online preferences and their interplay with participation in CE activities. This tool can be used in different countries in different stages of circular economy policy and practice designs and implementation to better inform industry and policy. Our results show that participation in CE activities influence perceptions and shifts focus, resulting in a different ranking of online attributes. This means that different strategies need to be adopted for different types of consumers, depending on their knowledge and experience with CE activities.

For practitioners, our study offers valuable insights on how to deal with consumer perceptions in order to increase participation in their CE-related businesses. While our results show that third-party related attributes are the best ranked, entrepreneurs and managers are still able and strongly encouraged to navigate all processes around these attributes in order to maximize conversion. Practitioners should also be motivated to apply our study setup to their company-specific context and rank additional/different attributes to determine their specific action plan.

Based on this initial study, we offer several pathways for future research to expand on this topic. While user reviews and guarantee/warranties are already commonly used, one interesting direction for further research would be in how far these mechanisms can be optimized and potentially monetized. Studies revealing how high the willingness-to-pay for additional information in either form are strongly recommended. For example, a study focusing on willingness-to-pay for third-party CE certification should be conducted to foster understanding for the potential of this measure in the context of CE. As our results suggest, it is also important to further study the differences between respondents without prior CE experience and respondents who are highly involved in CE activities, as they have different preferences and expectations. This leads to the expanding body of literature that supports the need for further segmentation of what we might define as the “green” consumer, given the different aspects and complexity of such behaviors [66].

Due to the limited number of attributes we tested, we suggest to apply our study design for a multitude of attributes and compare the best-scoring ones across singular studies. We also suggest breaking down the analysis to specific CE activities, as it might be that the ranking will change in the more specific contexts, as well as expand research from a single location to an international context. A comparison of different countries might also be interesting with regard to cultural differences and levels of acceptance of CE in different geographies. Further, future research is advised with regard to the interplay of personality traits and consumer perceptions of online attributes. The scholars Mulyanegara et al. [67] and Matzler et al. [68] illustrated a significant relationship between personality traits and brand preferences of consumers, which might be transferable in the context of consumer perceptions of online attributes in the context of CE.

Author Contributions: Conceptualization, analysis and writing: N.S. Supervision, review and validation: S.S. Further review and validation: H.V. Review and writing: V.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.


Acknowledgments: We thank Christian Schlereth (WHU) for his sparring and introduction to DISE.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Online Survey Example Screen

Online Attributes in Circular Economy (CE)

Progress 15%



1 Which of the following attributes do you consider the most and which least helpful for the online presence of a Circular Economy (CE) business. Make one choice for each category.

Most Helpful		Least Helpful
<input type="radio"/>	<p>Explanation of Business Model and Processes</p> <p>A dedicated category on the website that explains what is special about the business model and how it adheres to CE. Furthermore, processes are illustrated in order to facilitate understanding.</p>	<input type="radio"/>
<input type="radio"/>	<p>Instant Chat</p> <p>Instant communication tool for communication with company. Possibility to reach company representatives if questions with product/service and/or background processes occur.</p>	<input type="radio"/>
<input type="radio"/>	<p>User Reviews</p> <p>Reviews of prior customers with the common "text and star" layout under all products.</p>	<input type="radio"/>

Figure A1. Example of Screen Survey (DISE)

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