


## Article

# Circular Economy Strategies with Social Implications: Findings from a Case Study

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**Abstract:** To progress towards sustainable development, more companies are voluntarily committing to move from a linear economy to a circular economy (CE), mitigating resource consumption and waste generation. Despite the commitment of companies, there is a lack of understanding of how stakeholders view reduction, reuse, and recycling (3R), and the social aspects related to them. Stakeholders were asked how they perceive CE strategies, and more specifically, how they perceive that these strategies, observed in the practice of the 3Rs, transcend into social aspects. The objective of this research is to analyse stakeholders' perception of CE strategies using the 3Rs framework and stakeholder theory. Using a qualitative methodology, we conducted a case study for Green Glass, a company that uses glass as an input to manufacture its products. By analysing the content of 20 interviews, 23 videos, and 24 news items related to the company, we found that Green Glass stakeholders perceive the contribution of the 3Rs towards CE and that these have social implications, such as supplier evaluation with social impact, responsibility for the product, and decent work.

**Keywords:** circular economy; life cycle analysis; social implications; sustainable development; stakeholders; upcycling; 3R strategy



**Citation:** Mansilla-Obando, K.; Jeldes-Delgado, F.; Guíñez-Cabrera, N. Circular Economy Strategies with Social Implications: Findings from a Case Study. *Sustainability* **2022**, *14*, 13658. <https://doi.org/10.3390/su142013658>

Academic Editor: Ana Ramos

Received: 3 August 2022

Accepted: 17 October 2022

Published: 21 October 2022

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## 1. Introduction

*“Until all the glasses in the world are bottled”* (Green Glass company)

One of the targets of Sustainable Development Goal (SDG) number 12, imposed by the United Nations (UN) for the Global Compact partner countries in 2015, indicates that by 2030, waste generation should be significantly reduced through prevention, reduction, recycling, and reuse actions [1]. Achieving this goal is a challenge to which we are not oblivious, and the circular economy (CE) supports this implementation as it is a means to achieve sustainable development [2–6].

CE is receiving increasing attention as an alternative to the current linear take–make–dispose system [7]. For their part, companies are transforming their processes from this system to a circular one by considering it as a long-term solution to environmental problems [8–10]. While there are many definitions and interpretations attributed to CE [2,11–13], to the Ellen MacArthur Foundation [14,15], this new economy called CE is defined as “an industrial economy that is restorative or regenerative by intention and design”. For its part, for the European Action Plan, the CE is “where the value of products, materials, and resources are retained in the economy for as long as possible, and waste generation is minimized” [16]. This quest to minimize waste is observed, for example, with plastics [8,17,18], food industry [19], electrical appliances [20], or solid waste [21].

For a CE model to be successful, it must contribute to the three dimensions of sustainable development [22]: economic (e.g., by reducing energy use in the production process),

environmental (e.g., by reducing waste generation), and social (e.g., by improving employment conditions) [23,24]. In addition, it should consider innovative and cooperative stakeholders that help society achieve sustainability and well-being with low or no material, energy, and environmental costs, which are key elements of CE [8,25–27].

The literature on CE has been prolific, studying its origins and business models (e.g., [12,28]), its determinants and barriers (e.g., [29]), and the methods for implementing strategic models for specific solutions (e.g., [2,30]). However, there is a need to include the discussion of the CE with the stakeholders (e.g., workers or buyers) [26], as well as to examine how the analysis of CE practices can impact social aspects to improve social welfare [31,32]. According to Padilla-Rivera et al. (2020) [31], it is relevant to identify the inclusion of the social dimension in CE for a better understanding of the progress towards the transition to sustainability. In their literature review study, it is concluded that the social aspects related to CE, such as those related to employment, health, security, poverty, and gender, are important because they help understand the negative externalities that arise when moving to a CE.

Thus, this study aims to learn how CE strategies are combined with social implications from the stakeholders' point of view. By doing so, the following research question is addressed: how do stakeholders perceive CE strategies, and specifically, how do they perceive that these strategies, observed in the practice of the 3Rs, transcend in social aspects?

To answer and analyse these questions in depth, the theoretical framework of CE strategies called 3R [33], the stakeholder theory to explain the participation of key stakeholders in CE [34], and the social implications associated with CE are used [31]. A qualitative methodology is used, and the results are obtained through content analysis. For this purpose, this article provides an illustrative example of linking 3R strategies and social aspects as perceived by stakeholders in a company (Green Glass), which has been using a CE model since 2012 by reusing discarded glass bottles.

The interest in glass lies in the fact that it is a universal packaging material that causes adverse effects on the environment when it reaches landfills. This material is mainly used in the beverage sector in producing wine, beer, beverages, water, juices, or preserves; its natural greenish or crystalline colour is 100% recyclable and can be reprocessed an unlimited number of times. This packaging maintains its properties only with a previous washing for new use [35]. This is important because Chile is considered the second largest wine-producing country in Latin America [36], and the stakeholders are responsible for recycling this container, which is the function provided by the Green Glass company.

In Chile, the Ministry of the Environment (MMA) has promoted several programs and laws to promote sustainable and CE practices in the private and public sectors [35]. For example, the #ElijoReciclar program, through which, stakeholders require companies that use glass to make their recycling practices transparent. For this purpose, clean points and green points are placed in different communes of the country, recycling at home, and the deposits of 'green bells' of companies in the glass industry: CristalChile and Cristoro [37]. These companies also seek to provide social actions to corporations such as Coaniquem [38] or animal rehabilitation centers [35]. Another example is the extended producer responsibility law (EPR Law), which indicates that from 2022, the producers and importers must organize, finance, and valorise the collection of their waste, promoting a CE [39]. The stated goal is to enact 65% glass recycling by 2030 [40]. Therefore, the Chilean MMA, along with producers, buyers, recyclers, and local city halls, have obligations in the industry. However, hand in hand with innovation in the glass industry, companies such as Green Glass seek to create value with glass together with their stakeholders and work under the paradigm of sustainability.

Therefore, for the analysis of this study, several sources of information are used to understand the case from the point of view of the stakeholders, such as recyclers, buyers, workers, and the company's founding partner. Twenty interviews were conducted with buyers of the Green Glass company, and 23 videos, as well as 24 news items about the Green Glass company available on the web were reviewed.

This article is structured as follows. The following Section 1.1 explains the theoretical framework of the CE: 3R strategies. Section 1.2 presents the stakeholder theory and its relationship with CE. Then, in the following Section 2, the qualitative method applied, the case selection, and the explanation of the industry under study are explained. Section 3 presents the results obtained. Section 4 discusses the findings regarding the framework of CE strategies and related social aspects. Finally, Section 5 presents the study's conclusions, managerial implications, and research limitations.

### 1.1. Theoretical Framework: Circular Economy Strategies: 3Rs

Circular economy (CE) is studied under the so-called “R” strategies that summarize the main ideas for further circularity [33,41]. The CE strategies: “3R” are defined as reducing, reusing, and recycling, which, when implemented in companies, achieve CE [25,33,42]. Although it is possible to find R imperatives from 4R to 10R, it is still necessary to know about the corporate commitment to 3R [8]. Studies of the 3Rs in Europe, Japan, the USA, Korea, and Vietnam identify CE strategies as initiatives related to waste management policies, where several actors participate [12,25,43,44]. That is why cooperation within and between various stakeholders, such as government, academy, non-governmental organizations, companies, and the public, is important to support and implement these strategies [33].

While [2] indicates that to achieve circularity, the order of the “R” strategies may not be the same for certain products and conditions, for [33], the “Rs” share a hierarchy, having to start with the “R” action of reducing. In this way, the first strategy is to reduce, the second to reuse, and the third to recycle.

Reducing refers to preventing waste generation as a priority [8]. This involves, for example, changing the design of products or packaging to consume the least number of resources [45]; avoiding the use of landfills to reduce greenhouse gas emissions; and managing waste for better circulation of materials [25,44], the work of grassroots recyclers and the awareness of the population for lower consumption.

On the other hand, reusing focuses on operations in which products or components that are not waste are reused for the same purpose, thus reducing the use of virgin material [2,33]. This strategy allows for the reduction of resources, energy, and labour, compared to the production of new products with virgin materials [46], which is very attractive and beneficial [25]. In the case of glass, life cycle analysis (LCA) avoids the emission of harmful substances [46].

Finally, recycling refers to recovering materials that are “waste”, which are reprocessed into products, materials, or substances for the original purpose or another purpose [8]. This ensures that materials or products are kept in a reuse cycle; when this is not possible, they are recycled [8]. Therefore, the materials' consistency, purity, and efficiency of the process must be considered, such as that of glass, which has unlimited recycling and reuse [11,47]. Therefore, according to authors, recycling is the least sustainable solution in terms of efficiency and cost-effectiveness compared to previous strategies [48].

### 1.2. Theoretical Framework: Stakeholders Theory

To address a CE model in which stakeholder participation is crucial [26], we resorted to stakeholder theory [34]. According to [34], organizations are part of a network of relationships with stakeholders who have various interests in the organization. Stakeholders can be workers, suppliers, the government, communities, buyers, and can even, from a non-separatist logic, include owners or shareholder partners [49].

Other studies have used this theory to explain that the adhesion or inhibition of actions of companies towards the adoption of CE strategies responds, for example, to the participation, commitment, cooperation, and pressure from stakeholders on companies [26,50,51].

Based on the objective of this research, stakeholder theory allows key stakeholders to articulate CE strategies: 3R strategies from a logic that fosters the company's commitment to CE [49]. Based on this perspective, we can explain how recyclers, buyers, workers,

and the founding partner, participants in the shared strategy, perceive that 3R strategies are present in the CE model of the company in this case study. Likewise, how these CE strategies and tools address and integrate the social aspects of CE [31], for example, the social impact of buyers by making donations; decent work by dignifying the work of waste pickers; and product responsibility that considers communication and labelling that promotes environmental co-creation.

## 2. Materials and Methods

### 2.1. Design of the Investigation

Under a qualitative methodology, a case study is used to analyse the perception of CE strategies in depth: 3R in the Chilean company “Green Glass”. This will allow the analysis of a phenomenon in a natural context, generating interaction between theory and practice [52–57].

### 2.2. Selection and Identification of the Case: Green Glass Company

The selected case is Green Glass, a Chilean company that, since 2012, has been dedicated to transforming glass bottles into glasses. Its headquarters are in Santiago, Chile. Today, this company manufactures 58 thousand glasses per month, reaching 25 countries [58].

This company is a recognized emerging brand because it has a positive impact on society and the environment [59]. It is a member of the World Trade Fair Organization because it carries out fair trade practices, and it also has alliances with non-profit organizations through those that make charitable contributions (for example, the foundation for children with cancer and the reforestation foundation).

The criteria for selecting this company are based on the fact that Green Glass presents an adequate context to study CE in an emerging country in Latin America: Chile, which is characterized by having consumers who are very concerned about the environment and who take advantage of their actions to reduce their waste, in comparison to other countries in the sector [60].

With the above, we refer to the interviews that the founding partner has given in several media, where he expresses the principle of the company, which is to achieve a paradigm shift from the concept of garbage to something that is “useful and beautiful” as it is a “glass” [61]. In Oscar’s words (founder of Green Glass): “we are trying so that people can see beyond the glass, and what that glass means” [62]. Likewise, the founding partner makes it clear that his company works to recognize and dignify the work of grassroots recyclers and that they are working to become an ecological company using 100% renewable energy.

In this way, the Green Glass company sees the importance of waste as an essential element to generate value for the environment and consumers, being a tremendous upcycling initiative [63]. In summary, Figure 1 explains the production process of Green Glass, which begins with the collection of glass bottles, and then with the manufacturing process of the glass for subsequent sale. The bottles that come from the garbage are directly collected by the base recyclers, by recycling centres, or are acquired by personnel who work with the waste of the wine companies. Later, the bottles are cleaned, cut, and polished in a treatment cellar. Then, in a creative process, some disruptive theme is selected or related to the culture or current times, for example, Nobel Prize winners of Chilean literature, such as Pablo Neruda and Gabriela Mistral, the pride glass; or popular phrases or Chilean memes, such as “Tell the truth Rosa”, or “Friend, take a risk”, which are drawn on the glass, as shown in Figures 2 and 3 with examples of the products. Finally, the glasses are stored and sold through their website as recycled and original glass glasses. In this sale, from Green Glass through special promotions or from the consumer, you can choose to make a donation to a foundation, for example, donate a tree or sterilize a puppy. More than 30 million Chilean pesos have already been raised for foundations [64].



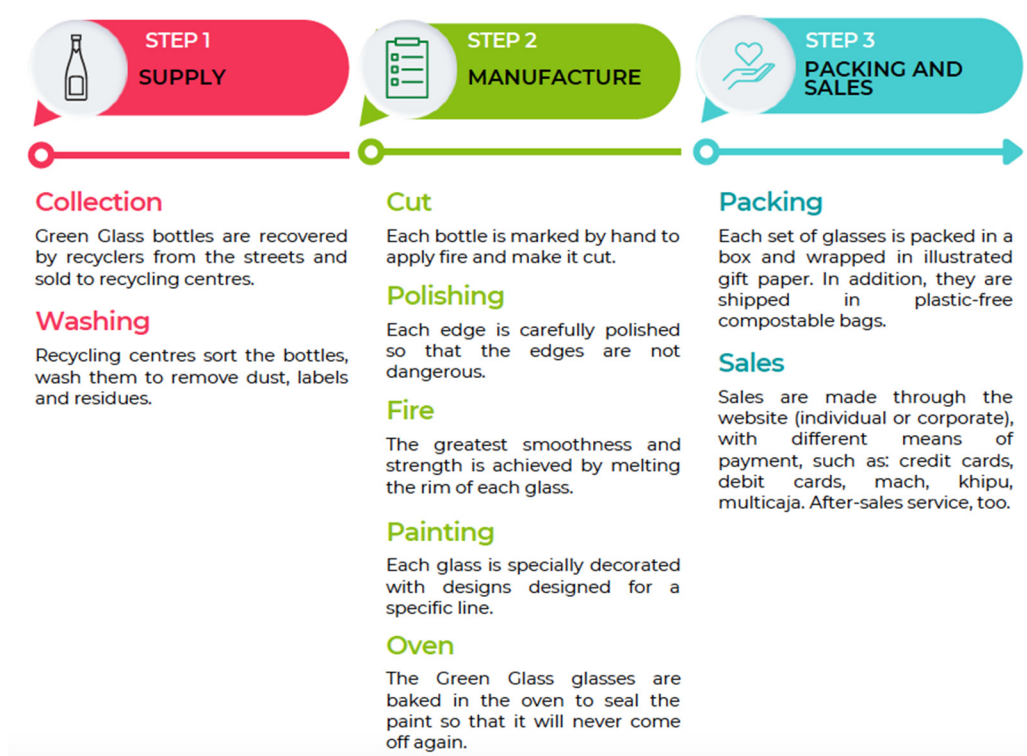


Figure 1. Production process of the Green Glass company, adapted from its website.



(A)



(B)

Figure 2. Products offered on the website of the Green Glass company. (A) Cultural themes when showing “Chile, a country of poets”. (B) Relevant topics such as the support of Green Glass and the “Todo Mejora” Foundation for the LGBTIQA+ community. Images obtained from the Green Glass website.



Figure 3. Products offered on the website of the Green Glass company. Popular viral phrases or Chilean memes. Images obtained from the Green Glass website.

### 2.3. Data Collection

Case studies comprise multiple sources and techniques to collect data; in this case, a combination of these primary and secondary sources is used to promote understanding of the phenomenon under study [52,53,56]. The primary sources correspond to 20 buyers interviews and 2 field observations. The secondary sources include 24 news articles, online documentaries, 23 videos related to Green Glass, official communication from the company website, and their social media accounts on TikTok, Instagram and Facebook. These sources were used to confirm the data that emerged during the fieldwork and to complement the narrative of the interviewees, which allowed the data triangulation [65]. Using both sources ensured more excellent reliability of the results, thus reducing the bias of a single observation or the interviews carried out [66,67]. It should be noted that data collection stopped when theoretical saturation was reached [52]. Table 1 shows the number of primary and secondary sources used and Table 2 shows the characterization of the sample of interviewees. Tables A1 and A2 detail the secondary sources used to understand the phenomenon.

**Table 1.** Data sources used in the Green Glass case.

Source	Quantity
Primary sources	
Buyer interviews	20
Field observations	2
Secondary sources	
News	24
Videos	23

Source: Own elaboration of the authors.

**Table 2.** Characterization of interviewees: Green Glass buyers.

B <sup>1</sup>	G <sup>2</sup>	A <sup>3</sup>	N <sup>4</sup>	How Did You Hear about Green Glass?	Purchase Reasons
B1	F	37	7	Social networks	Gift-Recycled material
B2	F	33	4	Corporate gift	Gift-Ecofriendly
B3	F	25	2	Social networks	Recycled material
B4	M	35	6	Social networks	Design-Recycled material
B5	M	35	1	Social networks	Design
B6	F	24	1	Social networks	Gift
B7	F	35	2	Gift to friend	Design-Recycled material
B8	F	34	2	Social networks	Gift-Sale-Design
B9	F	26	1	Social networks	Design
B10	F	30	2	Social networks	Gift
B11	F	31	1	I knew the founding partner	Gift
B12	F	34	1	Social networks	Gift
B13	F	38	3	Note in news	Company B-Quality-Gift
B14	M	33	2	Friends with products	Design-Recycled material
B15	F	26	3	Gift search	Gift
B16	F	23	1	Social networks	Donaciones
B17	F	25	1	Note in news	Quality-Recycled material
B18	F	33	3	Social networks	Donations-Recycled material
B19	F	33	5	Interest in CE	Support for chilean SMEs-Recycled material
B20	F	47	1	Social networks	Donations-Recycled material-Marketing

B<sup>1</sup>: buyers' identification. G<sup>2</sup>: gender. F: female. M: male. A<sup>3</sup>: age in years. N<sup>4</sup>: number of times bought in Green Glass. Source: Own elaboration of the authors. Interviews conducted between July and August 2021.

Regarding the semi-structured interviews, these reached the saturation point at number 20; at this point, the interviewees began to reinforce the previous information without adding more new information [68]. The interviews lasted between 60 and 120 min each. These were carried out by the authors and by a research assistant during July and August 2021 by telephone. The questionnaire consisted of 15 questions where they were asked about their background, their purchasing experience, and their perceptions about the relationship between Green Glass and the CE strategies. The buyers and potential interviewees were contacted through the social network Instagram. Those who had bought a product from the Green Glass company at least once were considered viable. Likewise, they were informed of the existence of an information confidentiality report to support anonymity during the interview. Along with these interviews, field observations were made by the authors in the Green Glass company's sales stores for a better understanding of the company's process.

On the other hand, the data from secondary sources were obtained by the three authors, who worked independently in the search, compilation and generation of data to align this information to its further analysis. For example, for the analysis of the videos of the 544.66 min available on the website about the Green Glass company, each author analysed 181.55 min, corresponding to a little more than 3 h of audio-visual material for the analysis of the business. In addition, for the news, the analysis by the author was 8 news items each. This was done during August and September of the year 2021.

#### *2.4. Data Analysis*

The data collected were subjected to a careful process of analysis. Before this, it was detected in the information collected, for example, that the interviewees had little knowledge of CE in Green Glass, but after a more profound exploration and debate, the interviewees indicated a negative attitude towards the word sustainability but a favourable attitude toward its underlying dimensions, such as environmental (mentioning the protection of the land, fauna, and the reduction of pollution) and social. To eliminate bias, the data were triangulated with the secondary sources collected and the field observations made. That is why, for the analysis, the indications of the inductive method of [69] were followed based on three stages: open, axial, and selective coding. In the first stage, the three authors independently read and coded the data, sentence by sentence, with discussions and stops in the coding process to arrive at a standard set of codes. In the second stage, the three authors collected the first-order codes that were conceptually similar and relevant. This process builds meaning using an iterative grouping process where the higher order constructs present similarities and relationships between them [52,70]. This leads us to the third stage, in which, according to [71], the topics related to the perceptions of CE by the various actors were added. Here, the results were compared, and the discrepancies found were discussed [72]. In this stage, the creation of topics arose from the interpretation carried out by the researchers, which was carried out actively from the components of the grouped codes identified from the interviews, news and videos [73] and the grounded theory of CE strategies: 3R and stakeholder theory, concerning the related social implications. Based on the theories and through iterative cycles, a coherent account was obtained for the case under study.

### **3. Results**

By exploring the perception of the stakeholders: recyclers, buyers, workers, and the founding partner, regarding the presence of the CE strategies: 3R in the Green Glass company (reduce, reuse and recycle), and their observations about the link with the social aspects associated with CE, the following results were found.

#### *3.1. Reducing Strategy*

The stakeholders who perceived the reducing strategy were recyclers, buyers, workers, and the founding partner. This means that these stakeholders recognise that Green Glass

prevents the generation of waste, such as glass, which favours its management by reducing pollution and increasing people's awareness. In addition, this strategy is perceived to be connected to social aspects such as: supplier evaluation with social impact, responsibility for the product, and decent work. Specifically, recyclers perceive reducing as the importance of their work in collecting the "rubbish" of others and the social implication of having a decent job, as indicated by one of the recyclers in video 2:

*"I am proud of what I do. I don't ask anyone for anything, just what I earn. People who litter have different perceptions of us. I feel humiliated, I feel bad, I say, 'Why, why? You're throwing it away, I'm picking it up, I'm cleaning it for you'" (V2, waste picker)*

Similarly, the buyers perceive the work of the recyclers in the collection of raw materials for the Green Glass company, relating this to the social implication of decent work for them, as indicated by buyer 4:

*"The company had a good business style, because they gave work to many people, it was not like big companies, they were independent people, so to speak. Like people who collected bottles, hired them, and they kept collecting bottles so that they would have raw material for the company" (C4, buyer)*

In addition, this stakeholder not only perceives that it is important to recover this waste, but also perceives the contribution that Green Glass makes to different campaigns related to raw materials, such as the Reforestemos foundation, which is socially related to the supplier evaluation with social impact, as indicated by buyer 5. Moreover, buyers emphasize the work they do at the grassroots level and their transparency, being responsible with the product and its impact, as indicated by buyer 3:

*"Look, what I know is that they have basic recyclers who recover the bottles, then they pass them through the qualification process [...] I also know that, for example, with the purchases one contributes to various campaigns to contribute to reforestation and other aid campaigns. I think it qualifies as a B company" (C5, buyer)*

*"[...] in reality, the work they do at the grassroots, that's what I like the most. Like the process that comes before making the glasses, and they actually, uh, they make it very transparent on their website and the emails that you give, that you get after you sign up and buy. They keep telling you how they do it" (C3, buyer)*

The perception from the workers consists of the collection of bottles from the streets. Although it is perceived by this actor, it is not associated with a social aspect. It is observed in the worker in video 2:

*"He used to tell me, there are so many bottles lying in the streets, I wish I had a big truck and I could take them all away" (V2, worker)*

In addition, the founding partner perceives this strategy by quantifying the waste collected, and recognizing the work of the recyclers in the process, and the importance of this in the product offered. Therefore, this perception is consistent with the social aspects previously detected: supplier evaluation with social impact, responsibility for the product, and decent work, as the founding partner indicates in video 1:

*"All of us see that more than a million glass bottles are thrown away, we see that there is a large mass of 60,000 recyclers of people who live off society's waste. Today they are invisible, they are not recognised, they work informally and are like ghosts. We value their work, we work together with them to take people's rubbish and give it back in the form of a glass with that message" (V1, founding partner)*

### 3.2. Reusing Strategy

The stakeholders who perceived the reusing strategy were the buyers, workers, and the founding partner. These stakeholders recognise that Green Glass transforms "discarded" material into a marketable product, which, in turn, is connected to social aspects such as: supplier evaluation with social impact, responsibility for the product, and decent work. The



buyer relates this perceived CE strategy as one that involves the social aspects of supplier evaluation with social impact, as indicated by buyers 15 and 20:

*"I mean, I love the idea that they are like recycled bottles" (C15, shopper)*

*"Well, they are based on sustainability, they turn the bottles into cups and they have different organisations that they are helping, planting more trees for each cup you buy or for each quantity, some of that goes there or to other charities, to help others in the background, that is, with a social focus [...]" (C20, buyer)*

This actor also relates this strategy to the social implication of responsibility for the product, as indicated by buyer 18:

*"Yes, they wrap them with recycled paper, so it is very nice [...] when they wrap the cups, they come in a box and inside, sorry, on top of that box, comes a bag, and that bag you chop it up and you can bury it because they are biodegradable" (C18, shopper)*

Workers perceive this CE strategy as a transformation into something beautiful, relating it to supplier evaluation with social impact and the decent work that Green Glass provides, as the worker in video 2 indicates:

*"Here we transform that rubbish into something beautiful. It is a job that goes beyond, beyond money, beyond the work one does, it is like a mission. And perhaps a wonderful revolution" (V2, worker)*

The founding partner perceives this strategy as a transformative process that is favourable for the country, identifying social implications: supplier evaluation with social impact, responsibility for the product, and decent work, as the founding partner indicates in video 8:

*"Green Glass' mission is to make every glass in the world a bottle glass, [...] we tell the world this story, that we want to change the face of recycling in Chile, that we want bottles not to be thrown away, and we propose these products that are very entertaining" (V8, founding partner)*

### 3.3. Recycling Strategy

The stakeholders who perceived the recycling strategy were the buyers and the founding partner of Green Glass. These stakeholders recognise that Green Glass recovers materials that are waste for them, reprocesses them, and ensures that they are kept in a reuse cycle. This, in turn, connects to social aspects such as: supplier evaluation with social impact, and responsibility for the product. For example, buyer 11 refers to her perception of CE, focusing on its impact on society.

*"Here we know perfectly well what the production process is, and also that the production process is a process that helps with recycling, care for the environment, etc." (C11, buyer)*

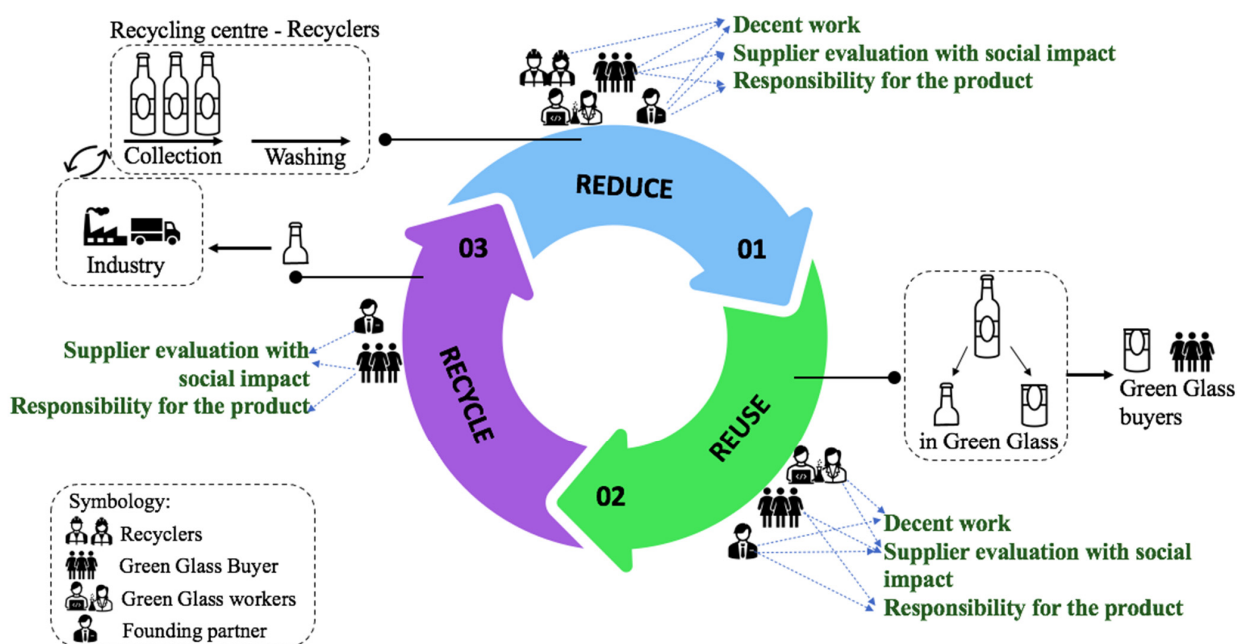
And buyer 13 perceives it as a social implication with regard to the responsibility for the product, as she affirms:

*"The positive thing is that it is recycled material, that it is easy to recycle again, and apart from being recycled it is beautiful, you can even give it as a gift" (C13, buyer)*

On the other hand, the founding partner indicates and confirms the recycling strategy, focused on the supplier evaluation with social impact:

*"From all the bottles that are received at the recycling centre, if we don't use them for glass, they go back to the glassworks where they will grind all the glass and transform it into bottle again" (V3, founding partner)*

The synthesis of these results in the following Figure 4.



**Figure 4.** Results of stakeholder perception of the CE strategies: 3R and social aspects identified in the Green Glass company. Author's own elaboration.

#### 4. Discussion

More and more companies are concerned about the environment and follow the philosophy of a CE model. For example, from the glass industry, for which the main environmental impacts from glass making are the emissions of combustion gases and the heat reaction of components, sustainability strategies can diminish their related impacts [74].

Given the persistent threat of global warming and social needs, it is important to reflect on the most common strategies of the model (3R) in a real company, through the perception of the key stakeholders involved, who see several social implications in these circular practices.

Using the case of the Chilean company Green Glass, this study identified, on the one hand, that stakeholders: recyclers, buyers, workers, and the founding partner, perceive the presence of at least one of the CE strategies: 3R and, on the other hand, that most of them associate them with certain social implications.

First, beyond the findings of recent studies, which distinguish buyers and workers as stakeholders who observe and participate in CE practices, as in [26,75], we also identify key actors in the value chain of this model, such as waste pickers and the founding partner, who not only recognise the presence of the 3Rs, but also promote them from their roles in the company.

Second, we believe that the link that stakeholders have with the Green Glass company influences the perception and recognition of the CE strategy: 3R. However, we argue that the perception of the impact that these CE strategies have on society [31] can be explained by each stakeholder's experience with Green Glass. Thus, while reduction is perceived as the ability to reduce waste by recyclers, buyers, workers, and the founding partner, [8,32], the social implications of this strategy are mainly associated with decent work. CE business models have dignified work that has been discriminated against for decades, such as waste collection. The work of waste pickers is now recognised as an indispensable link that plays an important role in CE [76], considering them as a part of the community that provides guidance on the repair and replacement of the product [43]. In other words, the strategy of reducing enables recyclers' work to be recognised as decent work. This is similar to what authors call green employment in eco-innovative enterprises that promote the need to acquire and disseminate their environmental skills [77]. Therefore, as [78] points out, it is important to consider the informal recycling systems that already exist

based on their practice, while working to improve efficiency and the working conditions of recyclers in developing countries. On the other hand, in CE, reducing is related to design and production, which involves eco-design, energy efficiency, and transparency in the production scale [43].

Another social implication that buyers and the founding partner associate with the strategy of reducing is supplier evaluation, with the social impact of supporting recyclers, and the social campaigns promoted by Green Glass. For example, through the Reforestemos foundation, where it is hoped that by planting trees, soil degradation, which has increased due to the accumulation of waste, will be remedied (even if only minimally). This social implication is in line with the efforts that civil society organisations are promoting to achieve the SDGs [1,79]. Likewise, buyers relate this strategy to the social implication of responsibility for the product, indicating that the Green Glass company is transparent in its processes, making visible on its website and social networks how they do things. Studied by other authors as the experience of buying circular products, where through the economy of experience, personal practices can be created that consumers value, generating a value proposition from the collection of waste in the CE [80].

The reuse strategy is perceived by workers, buyers and the founding partner as the transformation of the recovered glass bottles into a new product. This strategy allows for an extension of the life of the product [43], as well as helps to achieve closed loops of energy, as in the study in Sweden or Germany [43]. This transformation is linked to the social impact of the waste pickers and is related to decent work, which is also perceived by the workers involved in the production process at Green Glass. In fact, workers see their work as part of a mission that revolutionises what they are used to from traditional economic models that they simply discard. As indicated by [31], the CE has the potential to create new jobs, being the path to decent work; therefore, they should receive constant training and skills necessary to perform in this new economy.

Likewise, the reuse strategy is associated with the responsibility for the product, as it is perceived that there is a concern for caring for the environment with initiatives that guarantee sustainable waste management, for example, the use of paper packaging or biodegradable bags. This is in line with studies that highlight the importance of green packaging, which is the use of sustainable materials and designs for product packaging [81].

Regarding the recycling strategy, it is perceived only by buyers and the founding partner, who recognise the remanufacturing or reuse of waste by Green Glass. This strategy is linked to the supplier evaluation with social impact of caring for the environment by not generating waste or remanufacturing it [12]. The parts of the recycled bottles that are not used in the production process of a Green Glass tumbler are sent to a company that grinds the glass to make new bottles, which is relevant, as glass is 100% recyclable, unlike other tumblers that are made of glass material that require another process. Recycling is also linked to responsibility for the product by using packaging made from materials that are reused (e.g., cardboard and paper). Additionally, this strategy is linked by the energy recovery [35,43], even as strategies of the companies for which renewable energy is implemented in the CE process [43].

Finally, we believe that stakeholders' commitment and concern for environmental care guides a greater sensitivity to perceive the presence of CE strategies: 3R in the Green Glass company, e.g., consumers (e.g., [82]). The same can be said for the vision of the founding partner of Green Glass, who aims to lead the implementation of CE principles rather than acquire short-term financial gain [83], prioritising that his company's circular philosophy is recognised and shared by other stakeholders.

## 5. Conclusions

The aim of this paper was to provide a case study on CE based on the manufacturing of a product that contributes to 3R strategies, for which, the perceptions from recyclers, consumers, workers, and the founding partner were studied. Additionally, the practices by which these perceptions transcend into social aspects were analysed. This case study

was carried out on the Chilean company Green Glass. Based on a rigorous analysis using a qualitative methodology that allowed us to answer the research question of this study, it is concluded that stakeholders do perceive CE strategies by doing so through the actions of reducing, reusing, and recycling, with each stakeholder having a relevant role in the supply chain and process of the Green Glass company. In addition, the perceptions of CE detailed by each stakeholder allowed for the identification of their relationship to social aspects. These social aspects were grouped together in the supplier assessment for impacts on society, product responsibility, and decent work. However, their identification is not present in all strategies and is not perceived by all of the stakeholders considered.

Our work proposes a theoretical contribution to the framework of the CE strategies 3R: reduce, reuse and recycle, by establishing a relationship with social implications that are associated with the supplier evaluation with social impact, responsibility for the product, and decent work; all of which contribute to one of the pillars of the triple bottom line of sustainability: the social dimension. This is of great interest for the literature that indicates that, through CE, sustainability can be achieved. In doing so, this study contributes to the sustainability literature and to the SDGs proposed by the UN, mainly SDG 8: decent work and economic growth, and SDG 12: responsible production and consumption.

The managerial implications of the results of this study are aimed at confirming that, through CE, it is possible to capture the potential value of the three pillars of sustainability: economic, environmental, and social improvements promised by the 3R strategies of CE from the point of view of stakeholder perceptions and the social contribution offered by Green Glass. This is why we highlight the relevance and the example set by Green Glass to other companies and to emerging sustainable ventures and innovations that need to integrate waste recycling into their management system, which, if brought to formality and given the expected recognition, can provide a range of social benefits.

Our study, being based on a specific case study, has limitations and disadvantages in the generalisation of results and subjectivity. In this respect, the bias in the analysis of the data that could have occurred as a result of the selection of a qualitative methodology is mitigated by the use of diverse sources of information, by the coding from theory and by the triangulation carried out by the researchers. Another limitation is the geographical area analysed in an emerging country in Latin America and the specific study period.

On the in-depth understanding of a case, future research is suggested to look at similar success stories focused on CE in different economic sectors and in different contexts in Latin America, but also focusing on stories of failure. Additionally, to collect data for quantitative studies in order to analyse, for example, the intensity of social aspects in CE.

**Author Contributions:** All the authors designed the research. The idea of the research by K.M.-O. Conceptualization by K.M.-O. and F.J.-D. Methodology by N.G.-C. The data was collected by the authors and the research assistant. Analysis of data was performed by K.M.-O., F.J.-D. and N.G.-C. Writing, original draft preparation and editing by K.M.-O., F.J.-D. and N.G.-C. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Not applicable.

**Acknowledgments:** We are very grateful for the participation of Green Glass buyers in the interviews, and for the help of our research assistant: Paz Casaretto Palma, student at the School of Economic and Business of Universidad Finis Terrae, Chile.

**Conflicts of Interest:** The authors declare no conflict of interest. Green Glass had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results. Also, the authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A

**Table A1.** Secondary Source: Analyzed Videos on Green Glass.

Video	Video Name	Year	Minutes	Video Link
V1	Historia, charla Icare	2019	27.20	<a href="https://bit.ly/3PJjVAI">https://bit.ly/3PJjVAI</a> (accessed on 2 August 2022)
V2	Documental Netflix	2019	32.18	<a href="https://bit.ly/3oeCvoy">https://bit.ly/3oeCvoy</a> (accessed on 2 August 2022)
V3	Prensa Mega, Mucho gusto	2019	22.35	<a href="https://bit.ly/3PqGHgI">https://bit.ly/3PqGHgI</a> (accessed on 2 August 2022)
V4	Historia de Oscar Muñoz	2020	63.55	<a href="https://bit.ly/3uYDEnZ">https://bit.ly/3uYDEnZ</a> (accessed on 2 August 2022)
V5	Teletrece, cómo lo hizo	2018	7.11	<a href="https://bit.ly/3v4tbaq">https://bit.ly/3v4tbaq</a> (accessed on 2 August 2022)
V6	Las cosas buenas	2018	2.13	<a href="https://bit.ly/3v1LoFy">https://bit.ly/3v1LoFy</a> (accessed on 2 August 2022)
V7	Reforestemos	2018	1.28	<a href="https://bit.ly/3RNeaUg">https://bit.ly/3RNeaUg</a> (accessed on 2 August 2022)
V8	TVN Buenos días a todos	2015	16.55	<a href="https://bit.ly/3ojrUIY">https://bit.ly/3ojrUIY</a> (accessed on 2 August 2022)
V9	Green glass. Upcycled stories	2015	3.29	<a href="https://bit.ly/3aRjLxd">https://bit.ly/3aRjLxd</a> (accessed on 2 August 2022)
V10	El éxito de Green Glass	2020	13.59	<a href="https://bit.ly/3OoP9f4">https://bit.ly/3OoP9f4</a> (accessed on 2 August 2022)
V11	Fundación quiltro	2019	1.40	<a href="https://bit.ly/3BIT1uP">https://bit.ly/3BIT1uP</a> (accessed on 2 August 2022)
V12	Green glass on Tv	2012	2.44	<a href="https://bit.ly/3IWf4tO">https://bit.ly/3IWf4tO</a> (accessed on 2 August 2022)
V13	Charla en Uruguay	2018	33.11	<a href="https://bit.ly/3OmZLEf">https://bit.ly/3OmZLEf</a> (accessed on 2 August 2022)
V14	Inacap-video green glass	2017	1.33	<a href="https://bit.ly/3RR6rET">https://bit.ly/3RR6rET</a> (accessed on 2 August 2022)
V15	Café social-Canal13	2019	43.08	<a href="https://bit.ly/3PoYefO">https://bit.ly/3PoYefO</a> (accessed on 2 August 2022)
V16	Entrevista a Oscar Muñoz	2016	4.59	<a href="https://bit.ly/3PrEUYU">https://bit.ly/3PrEUYU</a> (accessed on 2 August 2022)
V17	Workcafé Santander	2020	71.16	<a href="https://bit.ly/3v3ioO1">https://bit.ly/3v3ioO1</a> (accessed on 2 August 2022)
V18	Green glass-la marca del año	2020	0.29	<a href="https://bit.ly/3v5wdLQ">https://bit.ly/3v5wdLQ</a> (accessed on 2 August 2022)
V19	Video FEN	2015	5.05	<a href="https://bit.ly/3cuSnRd">https://bit.ly/3cuSnRd</a> (accessed on 2 August 2022)
V20	Emprendimiento AIEP	2020	86.05	<a href="https://bit.ly/3PrV3Oa">https://bit.ly/3PrV3Oa</a> (accessed on 2 August 2022)
V21	Charla inaugural CChC	2021	95.59	<a href="https://bit.ly/3oig2H9">https://bit.ly/3oig2H9</a> (accessed on 2 August 2022)
V22	Green Glass in formula-E	2020	12.07	<a href="https://bit.ly/3oj06oc">https://bit.ly/3oj06oc</a> (accessed on 2 August 2022)
V23	Emprendimiento chileno	2019	9.27	<a href="https://bit.ly/3IWyA9h">https://bit.ly/3IWyA9h</a> (accessed on 2 August 2022)
<b>Total</b>			<b>544.66 min</b>	

Source: Own elaboration of the authors. Review carried out between August and September 2021.

**Table A2.** Secondary source: analyzed news on Green Glass.

News	News Name	Year	News Link
N1	Emprendimientos chilenos que crearon negocios siguiendo los conceptos de la EC	2020	<a href="https://bit.ly/3yXcVZX">https://bit.ly/3yXcVZX</a> (accessed on 2 August 2022)
N2	Menos vidrio a los vertederos, la apuesta de Green Glass	2015	<a href="https://bit.ly/3zj5ii6">https://bit.ly/3zj5ii6</a> (accessed on 2 August 2022)
N3	Reflexiones sobre la EC en Chile	2018	<a href="https://bit.ly/3IUNjld">https://bit.ly/3IUNjld</a> (accessed on 2 August 2022)
N4	Dialogan sobre sustentabilidad y EC en la salmonicultura	2021	<a href="https://bit.ly/3v2KXv0">https://bit.ly/3v2KXv0</a> (accessed on 2 August 2022)
N5	Las iniciativas que buscan profundizar la EC en la industria	2021	<a href="https://bit.ly/3yNYpDK">https://bit.ly/3yNYpDK</a> (accessed on 2 August 2022)
N6	Creador de green glass y haciendola.com participará en la cuarta jornada de amabilidad	2019	<a href="https://bit.ly/3v5dzUl">https://bit.ly/3v5dzUl</a> (accessed on 2 August 2022)
N7	5 ideas para ser una empresa circular	2021	<a href="https://bit.ly/3RQHklm">https://bit.ly/3RQHklm</a> (accessed on 2 August 2022)
N8	Greenglass: el emprendimiento que ha salvado más de 60.000 botellas de convertirse en basura	2015	<a href="https://bit.ly/3okCoHS">https://bit.ly/3okCoHS</a> (accessed on 2 August 2022)
N9	En el día internacional del reciclaje realizan seminario de EC en Antofagasta	2019	<a href="https://bit.ly/3RZRf8u">https://bit.ly/3RZRf8u</a> (accessed on 2 August 2022)
N10	Economía circular en la industria del vino	2021	<a href="https://bit.ly/3cyhDGL">https://bit.ly/3cyhDGL</a> (accessed on 2 August 2022)
N11	Líderes en innovación social y comercio justo participarán en lanzamiento de programa birregional “Desafíos de sostenibilidad”	-	<a href="https://bit.ly/3yXe2sB">https://bit.ly/3yXe2sB</a> (accessed on 2 August 2022)
N12	Agricultura circular: los desechos como materia prima	2021	<a href="https://bit.ly/3v0quXG">https://bit.ly/3v0quXG</a> (accessed on 2 August 2022)
N13	¿Qué es la EC?	-	<a href="https://bit.ly/3yVv7mT">https://bit.ly/3yVv7mT</a> (accessed on 2 August 2022)
N14	El reciclaje es una moda y la ley de reciclaje es un somnífero	-	<a href="https://bit.ly/3zlWhom">https://bit.ly/3zlWhom</a> (accessed on 2 August 2022)
N15	Desafíos de sostenibilidad abre convocatoria para emprendedores y empresarios de Antofagasta y Tarapacá	2021	<a href="https://bit.ly/3ciOm20">https://bit.ly/3ciOm20</a> (accessed on 2 August 2022)
N16	Fundador de Green Glass: quería tratar de cambiar el reciclaje	-	<a href="https://bit.ly/3PHWwQ1">https://bit.ly/3PHWwQ1</a> (accessed on 2 August 2022)
N17	Green Glass: el emprendedor detrás del proyecto	2017	<a href="https://bit.ly/3PpISkS">https://bit.ly/3PpISkS</a> (accessed on 2 August 2022)
N18	Políticas y prácticas B	-	<a href="https://bit.ly/3yV3c6x">https://bit.ly/3yV3c6x</a> (accessed on 2 August 2022)
N19	Green Glass: el emprendimiento chileno llega a Netflix	2018	<a href="https://bit.ly/3PpXqkl">https://bit.ly/3PpXqkl</a> (accessed on 2 August 2022)
N20	Green Glass: distinción marca chilena emergente	-	<a href="https://bit.ly/3RRw208">https://bit.ly/3RRw208</a> (accessed on 2 August 2022)
N21	Green Glass: emprendedores con misión	2020	<a href="https://bit.ly/3v71yh1">https://bit.ly/3v71yh1</a> (accessed on 2 August 2022)
N22	El joven embotellado	2017	<a href="https://bit.ly/2KZLn0l">https://bit.ly/2KZLn0l</a> (accessed on 2 August 2022)
N23	Ejecutivos Sub 30, la nueva cepa de emprendedores	2017	<a href="https://bit.ly/3PmJI1O">https://bit.ly/3PmJI1O</a> (accessed on 2 August 2022)
N24	Hernán Inssen, director de Hope	2019	<a href="https://bit.ly/3v2F5BS">https://bit.ly/3v2F5BS</a> (accessed on 2 August 2022)

Source: Own elaboration of the authors. Review carried out between August and September 2021.



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