

## Article

# Recognizing the Key Drivers and Industry Implications of Sustainable Packaging Design: A Mixed-Method Approach

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**Abstract:** Sustainable packaging design plays a strategic role across several industries. Using the Italian market as the perimeter of the analysis, this paper aims to broaden the knowledge of corporate attitudes, perceptions, and behaviors toward sustainable packaging along the entire supply chain. A mixed-method approach was used, integrating qualitative and quantitative data collected from 33 in-depth interviews and a survey on a sample of 462 companies. The results revealed that a challenging goal will consist of reconciling technological advances and marketing instances, and that the entire supply chain should be synergistically involved in packaging sustainability. It was also found that larger companies consider sustainability as part of a broader business strategy, whereas smaller ones possess a tactical vision. The study provides valuable insights to better comprehend and manage a complex ecosystem such as that of sustainable packaging.

**Keywords:** sustainable packaging; packaging eco-design; packaging supply chain; packaging re-use; packaging recycling; plastics



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## 1. Introduction

Sustainable packaging is a topic not univocally represented since it involves numerous actors, namely the manufacturers and users from different industrial and commercial sectors, through a rather complex system of interactions [1]. It is reasonable to say that any sustainable packaging strategy aims to increase its value by reducing unsustainable consumption and the environmental degradation induced by industry [2].

Since 2015, when the United Nations created the Sustainable Development Goals (SDGs) [3], the commitment to sustainability has become the key to future competitiveness and an essential element of the policy-making agenda [4]. Therefore, European governments proposed a sustainable development strategy based on the concept of the “circular economy” [5], aimed at reducing waste generation, extending product life cycles, promoting reuse, and maximizing recycling [6].

Notwithstanding many scholars and organizations having dealt with sustainable packaging, there is still much debate on the multiple issues and the related possible solutions [7–9]. Several researchers have analyzed it from a consumer perspective [7,10], while others have studied the overall environmental impact of packaging, deepening the life-cycle assessments (LCAs), and new technologies and materials [11]. Alongside these, another stream of literature has concentrated attention on the opportunities and effects of package sustainability [12,13]. In this respect, packaging-related issues should not be treated tactically, but with a long-term vision [14].

Apart from a few previous publications [15–17], a structured framework involving the supply chain of packaging sustainability is not fully accomplished, particularly when referring to the Italian market and to (i) corporate attitudes, perceptions, and behaviors toward sustainable packaging; (ii) activities undertaken by the players in the supply chain to improve sustainable packaging; and (iii) key drivers of sustainable packaging that the companies consider as a priority.

According to a shared responsibility model, the above also considers companies' relationship with a regulatory agency responsible for recycling and recovery goals laid down by law. In Italy, such an objective is pursued by Conai, the nonprofit consortium for packaging recycling and recovery. The Conai Consortium operates with several stakeholders, favoring technical contributions in packaging design, production, and disposal, and ensuring the necessary cooperation throughout the entire supply chain.

The present paper is aimed at filling the above gap since: (i) it provides valuable insights on the peculiar Italian ecosystem of sustainable packaging, characterized by ambivalent conditions: on the one hand, its worldwide leadership in the packaging manufacturing industry, with proactive orientation to sustainable innovations and practices [18]; on the other, consumers' resistance to spending more for sustainable packages despite a growing sensitiveness for environmental issues [19], which leads to considering sustainability as still an immature concept; (ii) it ensures a better understanding of a complex phenomenon, which requires a systemic view of the packaging supply chain players; and (iii) it offers an update representation on how sustainable packaging, essential to our society, has become even more critical following the implementation of European Union (EU) directives on the circular economy (no. 849–852, 2018) and plastics (no. 904, 2019), which encourage companies to rethink packaging design, reuse, and disposal.

The paper is structured as follows: in Section 2, a theoretical background is proposed, and the descending research questions and hypotheses are posited; the methodological approach is explained in Section 3; the results are presented in Section 4; the discussion and conclusions are reported in Section 5; and the limitations of the study and possible research developments are noted in Section 6.

## 2. Theoretical Background, Research Questions and Hypotheses

### 2.1. Sustainable Packaging Trends and Future Challenges

In 2017, the Sustainable Packaging Coalition (SPC) defined sustainable packaging as being beneficial, safe, and healthy for individuals and communities throughout its life cycle. In [20], the authors merged the concept of packaging's social value with its protective function. In contrast, from a consumer point of view, sustainable packaging can be regarded as "a packaging design that evokes explicitly or implicitly the eco-friendliness of the packaging" ([7], p. 361).

Developing sustainable packaging involves various professional disciplines such as design, engineering, technology, marketing, and environmental protection [21], and requires a multidisciplinary, collaborative, and holistic approach [22,23], maintaining a favorable balance between the product and the packaging [24,25].

Therefore, packaging sustainability expands its borders, encompassing recycling, return and reuse practices, and eco-friendly systems and alternatives [26,27]. When discussing packaging innovation for sustainability, eco-design represents one of the essential areas of interest. An increasingly regulated framework, which asks for the respect of complex and rigorous norms, impacts environmental improvement, cost savings, and synergies along the supply chain [28]. Such attention to the integral packaging performance depends on exploiting emerging technologies and efficient integration [29].

### 2.2. Sustainable Packaging and the Supply Chain

In [30], the authors defined the supply chain as a system that includes purchasing and inbound logistics, production and distribution, and reverse logistics. A green and sustainable supply chain integrates environmental, social, and economic factors to determine the impact of a company's production process [31].

Within the packaging supply chain, three leading operators (suppliers, user companies, and recyclers) create, distribute, and manage the end-of-life of packaging to produce secondary raw materials, essential for improving the generated externalities [32–34].

Irrespective of its function, many efforts have been made to contain packaging costs [35,36]. In Europe, several countries have already begun to work on this subject,

mainly due to the policies devoted to the increased attention to sustainability. It was the European Commission's interest to ensure that, by 2030, all plastic packaging placed on the EU market is reusable or recyclable according to economic criteria [37]. In Italy (2018), the total amount of packaging sent for recovery amounted to 10.7 million tons, constantly growing over the years. Recycling has always been the leading destination of recovery activity within the country: 87% (9.3 million tons) of the recovered quantities were recycled, while the remaining 13% (1.4 million tons) were destined for energy recovery [38]. The recycling percentages in 2018, compared with the targets set for 2025 by the European directive, show that the supply chain achieved an improvement in overall recovery. Packaging manufacturing generated a total turnover in 2018 of USD 7.6 billion (+6.8% versus the previous year), and holds the world leadership, which makes this industry a benchmark for further sustainable development.

### *2.3. Sustainable Packaging as a Competitive Advantage*

The management of packaging sustainability entails a sum of relationships, and interactions among different actors of the supply chain are required [24]. However, to become a defendable competitive advantage, a sustainable package should enhance its value proposition [39]. The above foresees a double-sided improvement: the ecosystem integration and the focus on consumers' needs [40], improving access to the market, the strength of positioning, and the brand reputation [41].

Legal requirements and stakeholder pressure push the supply-chain companies to look for common synergies [42], far beyond packaging management of technological aspects. In addition, reducing the supply-chain footprint claims a continuous exchange of competencies among companies, involving quality management, process control, and shelf-life management [43]. Consumers become more sensitive to the topic on the condition that packaging redesign is appropriately perceived as an advantage—i.e., through measurable and objective indicators of sustainable performance—deserving a higher willingness to pay [13].

A final aspect within the above framework requires attention: sustainable packaging strategies cannot be treated as “one-size-fits-all.” A sum of variables impacts these differences, from the robustness of companies' business models' to their proactivity in managing sustainable packaging issues [44]. Furthermore, packaging sustainability reflects context-specific industries, so attitudes and perceptions of companies from different sectors may vary according to their priorities (from the level of investment to the perceived benefits of sustainability plans) [45].

### *2.4. Consumer Attitudes toward Sustainable Packaging*

Packaging manufacturers and users must identify and measure consumer perceptions, attitudes, behavior, and habits regarding packaging [46], also because the latter are responsible for recycling and reuse [28]. In [47], the authors stated that previous studies on consumer perceptions toward sustainable packaging could be categorized into three main streams: (i) general attitudinal models; (ii) holistic approaches focused on consumer perceptions and semiotics; and (iii) analytical techniques.

The first considers psychological factors, such as consumer knowledge and concerns, environmental awareness, perceived behavioral control, and subjective norms [48,49].

The second includes studies focusing on packaging and products contained within as a whole [50], investigating how consumers relate to the visual and verbal signals [7,51], and suggesting that consumers strongly rely on material/structural information when establishing an opinion on packaging sustainability [28,46,51].

The research on sustainable packaging included in the third stream holds a more analytical approach. Specific properties of packaging have been analyzed, such as transparency [52], single-versus multiserve formats [53], colors, and labels [54]. It was observed that the influence of packaging on product evaluations strongly affected consumer purchasing decisions.

Italian consumers stand out for their purchases' growing sustainability consciousness [55]: packaging has increasingly become a feature of product choice, with 54% of them often avoiding buying overpackaged products, and 47% preferring plastic-free products. However, 67% of them declared little willingness to recognize a price differential (40% are unwilling to bear a higher cost, and a further 26% could do so but reported a weak availability).

In the light of the above statements, the present study intends to answer four research questions:

RQ1: What are the primary sustainable packaging future challenges for packaging sustainability, as perceived by packaging supply chain actors?

RQ2: Which activities do the supply chain players undertake to improve sustainable packaging, including the key drivers of sustainable packaging that the companies consider a priority?

RQ3: What are the companies' perceptions towards Conai, the nonprofit consortium for packaging recycling and recovery?

RQ4: Do the attitudes and actions toward sustainable packaging change for companies of different sizes and sectors?

Regarding RQ4, sustainable packaging affects strategic and operational trajectories of the involved companies along the supply chain [16,17]. More specifically, priority attributed to packaging sustainability as a strategic goal, level of investments in sustainable packaging, reasons for investing in sustainable packaging, and expected positive returns on investments in sustainable packaging may vary according to companies' size and sector. Therefore, we formulated the following hypotheses:

**Hypothesis 1.** *There is a significant relationship of dependence between companies' size and their attitudes toward sustainable packaging.*

**Hypothesis 2.** *There is a significant relationship of dependence between companies' sector and their attitudes toward sustainable packaging.*

### 3. Methodology

A mixed-method approach was adopted, combining qualitative data collected from in-depth interviews and quantitative data from a survey. The research design focused on the qualitative phase, exploiting the quantitative one to test some ancillary aspects encompassed by RQ4.

There is a standard view of qualitative researchers using alternative principles and theories to study a phenomenon within the same objective [56]. Nevertheless, this variety assesses the richness of the qualitative research, which can "also be used as a substitute for classical quantitative profiling methods or to powerfully augment quantitative methodology" [57].

Despite its possible limitations (interviewee and observer error and bias), qualitative research can provide insights not covered by the previous literature [58], and becomes a reliable source of knowledge when the interviewees are managers and leaders within their businesses [59]. The qualitative phase aims to deepen and provide composite nuances of a given phenomenon through a large set of data collecting different viewpoints from heterogeneous sources [60]. The qualitative analysis followed a hybrid procedure benefiting from embedding pure qualitative and quantitative techniques [61].

A general inductive approach (GIA) conceptualizes the multifacet sustainable packaging domain in more abstract and causal terms [62]. A GIA is intended to synthesize and simplify the raw text data to establish clear links between the research objectives and findings. Within a GIA, deductive aspects (i.e., research questions) walk in parallel with inductive ones (i.e., data interpretation), aimed at developing categories to embrace the phenomenon to be studied.

A quantitative survey was carried out based on a structured questionnaire after completing the qualitative phase. The information gathered during the quantitative phase provided a dimensional measure of the qualitative data and enabled the authors to achieve a threefold goal: (i) to determine how practitioners perceive the role of sustainable packaging; (ii) to identify clusters of companies and their attitudes and behavior toward sustainable packaging; and (iii) to assess the presence of differences in the attitudes of companies toward sustainable packaging.

### 3.1. Qualitative Phase

To address research questions RQ1–RQ3, semistructured interviews were conducted to capture all the interviewee knowledge on sustainable packaging topics. In-depth interviews were preferred for focus groups because they allowed us to: (i) investigate individual attitudes and opinions from a phenomenological perspective, benefitting from the knowledge of a panel of experts; and (ii) avoid the group-dynamics effect, which could increase in-group bias and lead individuals to make (or agree to) decisions they might not reach on their own [63].

The interviews consisted of 16 open-ended questions and were conducted using an interview guide developed by the authors and subsequently reviewed by a panel of three experts: (i) a sustainability manager working for a large retail company; (ii) a manager from a food trade association with specific expertise in sustainable packaging trends; and (iii) a professor expert in sustainable supply-chain management and packaging LCA. Questions were arranged in the following blocks: (i) sustainable packaging trends (topics 1–2); (ii) perceived packaging supply-chain modifications (topics 3–6); (iii) sustainable packaging plans and actions (topics 7–8); (iv) changes and future challenges for sustainable packaging (topics 9–12); (v) roles of consumers, institutions, and operators in achieving and raising consumer consciousness about sustainable packaging (topics 13–15); and (vi) effects of plastic-reduction initiatives (topic 16).

The in-depth interviews were administered to a panel of 33 sustainability managers, quality managers, sales managers, marketing directors, and technical directors operating in Italy. Companies belonging to the various links of the supply chain were included, from industrial users of different packaging types (i.e., glass, plastic, paperboard) to packaging manufacturers, distributors, material producers, and consultant experts. The recruiting process took place by e-mail or telephone invitation: 33 individuals out of 38 agreed to be interviewed (see Table 1 for the sample structure). The interviews (approximately 30 min each) were conducted via VoIP or phone and were audio-recorded with the interviewees' consent. The authors conducted the discussions, and to reduce the observer error [59], the interviewees were divided into three equal groups, including at least one individual per role, and casually assigned to each interviewer.

Following the process model for deductive categorization proposed in [64,65], a content analysis was performed to analyze the data [66]. The process consisted of four steps: (i) data preparation, (ii) codes setting, (iii) codification, and (iv) interpretation. The audio files of the interviews were transcribed, and a set of verbatims was obtained. The three researchers' verbatims were independently read (triangulation approach) [59] before the coding categories were defined. The suitable lexical units were then placed into the corresponding coding category, according to a semantic coherence criterion. Finally, a unified version of the codes was developed to optimize the coding validity (i.e., validity and transparency issue).

**Table 1.** Code system (in decreasing order of incidence).

	#	%
Total codes	358	100%
Consortium role	67	18.7%
Signals and trends	53	14.8%
Eco-design	47	13.1%
Plastics	46	12.8%
Packaging and consumers	43	12.0%
Challenges ahead	42	11.7%
Packaging sustainability criteria	31	8.7%
Packaging sustainability as a business opportunity	29	8.1%

The resulting coding categories are illustrated in Figure 1.

### Sustainability concept

Signals and trends  
 Eco-design  
 Plastics  
 Packaging and consumers  
 Challenges ahead  
 Packaging sustainability criteria  
 Consortium role

**Figure 1.** Coding categories.

The coding process and subsequent analyses were performed with MAXQDA 2018 and T-Lab (release 2020), both QDA (qualitative data analysis) software packages. The coding system enabled the establishment of frequencies (words, lexical units, codes) and similarities among documents (i.e., contingency or co-occurrence analysis).

### 3.2. Quantitative Phase

A structured questionnaire of 10 closed-ended questions was developed, mostly composed of multiple-choice responses, whereas primarily essential characteristics of sustainable packaging were measured through a five-point Likert scale (1 = totally disagree; 5 = totally agree). Sample structure questions included: age, role in the company, years of service with the company, number of employees, and sector. Most of the questions came from the qualitative phase's insights, and the decision to prioritize multiple-choice responses depended on the fact that respondents were busy managers, possibly unwilling or unable to devote much time to the survey.

The questionnaire was divided into four blocks: (i) companies' initiatives toward sustainable packaging; (ii) main characteristics of sustainable packaging; (iii) expected return on investments in sustainable packaging; and (iv) requirements for improving sustainable packaging efficiency. The draft version of the questionnaire was pretested on a sample of 20 respondents (10 managers, 5 researchers, and 5 students) to (i) refine the wording; and (ii) refine the questions' sequence.

The respondents were recruited from LinkedIn through the first contact by direct message, explaining the research focus. As an extraction criterion, the individual's role in the company was adopted (marketing manager, quality manager, quality-control manager,

sustainability and environment manager, supply-chain manager, chief executive officer or general manager, and R&D manager). Approximately 2000 individuals were reached, with an acceptance rate above 20%. The data-collection activities took six weeks (middle of June–end of July 2019). A total of 478 questionnaires were returned (about 12 different sectors), 16 of which were excluded from the analysis due to inconsistent responses (i.e., missing data or number of choices selected higher than allowed). At the end of the process, a convenience sample of 462 companies was obtained.

SPSS Version 25 software was used to carry out the descriptive and multivariate analyses. More specifically, an exploratory factor analysis (EFA) was performed, followed by a two-step cluster analysis: first, a hierarchical one to determine the correct number of clusters; subsequently, a k-means clustering to set cluster size and profile. Aimed at testing for significant differences in attitude and behavior toward sustainable packaging, the chi-square non-parametric test of independence was adopted, complemented by phi-index and Cramer V index for the strength of association between variables.

## 4. Results

### 4.1. Qualitative PHASE

Overall, 101 codes and 358 lexical units were mapped (see Table 2). According to the Jaccard coefficient, the contingency analysis, performed through the similarity matrix among documents, revealed an average similarity value of 83%. Therefore, it was decided not to compare similarities between subgroups (i.e., type of company).

Table 2. Co-occurrence analysis.

Number and Type of Interviewee	Consortium Role	Signals and Trends	Eco-Design	Plastics	Packaging and Consumers	Challenges Ahead	Packaging Sustainability Criteria	Sustainability as a Business Opportunity	Total
04_Consulting firm	3	4	4	4	3	4	1	3	26
28_Food company	5	3	1	3	2	3	1	3	21
27_Food company	4	2	4	2	2	5	0	0	19
13_Food company (B2B)	2	3	1	1	3	6	1	1	18
01_Packaging manufacturer	2	3	1	2	2	0	5	2	17
18_Expert	2	2	2	1	2	2	3	1	15
09_Home and personal care company	5	1	1	1	1	3	1	1	14
15_Expert	4	3	2	2	0	3	0	0	14
03_Packaging materials producer	2	1	3	2	1	0	2	2	13
08_Fashion company	2	0	1	4	2	0	2	2	13
16_Packaging manufacturer	4	2	3	1	2	0	0	1	13
20_Packaging materials producer	1	4	1	3	1	0	1	2	13
11_Packager	3	2	2	3	0	0	1	1	12
17_Packaging materials producer	1	2	3	2	1	0	2	1	12

Table 2. Cont.

Number and Type of Interviewee	Consortium Role	Signals and Trends	Eco-Design	Plastics	Packaging and Consumers	Challenges Ahead	Packaging Sustainability Criteria	Sustainability as a Business Opportunity	Total
02_Packaging manufacturer	3	1	2	1	1	3	0	0	11
12_Home and personal care company	2	1	1	2	2	1	2	0	11
19_Packaging manufacturer	2	1	1	1	3	0	2	1	11
25_Consulting firm	2	2	1	1	1	2	1	1	11
07_Large-scale retail trader	2	1	2	2	1	1	0	1	10
14_Packager	3	1	1	1	2	1	1	0	10
23_Beverage company	2	1	3	0	2	1	0	1	10
26_Consulting firm	1	3	0	1	1	0	3	0	9
29_Packaging manufacturer	2	1	2	1	1	0	1	1	9
05_Food company	2	1	1	1	1	0	0	2	8
30_Consulting firm	1	1	0	1	2	2	1	0	8
10_Home and personal care company	1	1	2	0	1	2	0	0	7
24_Consulting firm	1	1	0	1	2	0	0	2	7
21_Home and personal care company	1	2	1	1	0	1	0	0	6
06_Large-scale retail trader	2	1	0	1	0	1	0	0	5
22_Food company	0	2	1	0	1	1	0	0	5
Total	67	53	47	46	43	42	31	29	358

Frequencies of lexical units by code category and interview are reported in Table 3. The results revealed that: (i) the interviewees contributed heterogeneously to the themes; (ii) no clear subgroups emerged in terms of participation in the discussion topics; (iii) with few exceptions, all of the respondents voiced their personal opinion on most of the themes, which led to the coding of specific lexical units; (iv) the codes that received zero scores were not referable to the same category of interviewees; and (v) following the particular role of the interviewees, no relationship could be established from the participation to the themes.

Table 3. Variance explained by factors.

Factor	Eigenvalue	Individual % of Explained Variance	Cumulative % of Explained Variance
1	2854	31.713	27.932
2	1183	13.146	44.859
3	1085	12.055	56.914
4	1002	11.185	68.049

In the following paragraphs, each of the eight code categories' main findings is reported. **Signs and trends.** The interviewees highlighted changes in market demand: cost-effectiveness and satisfactory packaging-protection needs, as well as reduction of packaging impact on the environment, thanks to the optimized use of resources and radical innovations (new materials). All the above can be considered the current trends that revolve around the circular economy and require that packaging be designed and implemented "to the minimum" and reused "to the maximum."

*Nowadays, several companies are testing new packaging materials or trying easy-to-use packaging on behalf of consumers, making the packaging more sustainable.*

*(Packaging user company)*

*Today, the trend is to move towards using recycled materials and encourage citizens to recycle everything.*

*(Consulting firm)*

**Packaging and consumers.** Packaging is not separate from the product, up to the point that consumers are often influenced by packaging design when choosing among alternative brands. Packaging is an essential element at the time of purchase, but packaging waste becomes a threat to the environment after use. It is unclear whether consumers would be willing to pay more for sustainable packaging or communicate packaging/product sustainability. Indeed, effective communication is a must for achieving sustainability, which has not yet been taken seriously by the market despite various efforts.

*Packaging must provide a service. Overpackaging does not offer any benefit, but in most cases, packaging fulfills its task of limiting damage to goods, and consumers are aware of this.*

*(Packaging manufacturer)*

*Consumers require much information to recycle and reuse packaging properly. We have designed labels that provide clear instructions to dispose of packaging correctly.*

*(Packaging user company)*

**Plastics.** Plastic should not be demonized. It is a versatile and safe material, indispensable for protection purposes, and because plastic-free biodegradable or compostable alternatives are still under development and do not always guarantee the same shelf-life and efficient end-of-life recovery. Disposing of end-of-life packaging has become a crucial issue, in which consumers are the main responsible actors.

*Since plastic was invented, it became critical to modern life because it is more durable and inexpensive than other materials. Plastic is a democratic material because it has enabled us to achieve things that were probably once reserved for the rich.*

*(Packaging user company)*

*Plastic is helpful, but it becomes a threat to the environment when consumers do not comply with the end-of-life waste regulations, which are very well known.*

*(Consulting firm)*

**Eco-design.** When designing packaging, it is essential to consider the environmental impacts of its entire life cycle, especially at the end of life. Packaging design requires collaboration and knowledge-sharing throughout the entire supply chain, since interactions between the numerous actors may provide valuable insights. Indeed, shared design rules are also needed, including constraints and impacts from the beginning of the project and joint investments (e.g., supplier–producer).

*New packaging projects must prioritize sustainability and circularity when considering the design, use, and disposal of end-of-life packaging. In my opinion, the packaging is sustainable when it is well designed and can be disposed of appropriately.*

*(Packaging manufacturer)*

*Undoubtedly, dialogue between all the supply-chain actors must start, considering the different points of view and changing the way companies face new challenges and significant shifting of culture and values.*

*(Packaging manufacturer)*

**Packaging sustainability criteria.** To ensure its sustainability, the packaging must meet several standards when manufactured, transported, and, after use, recycled. Therefore, manufacturers need to optimize packaging processes to reduce direct (materials, weight) and indirect (energy and water, transport) costs. However, this must be combined with the sustainability of the product it contains. Therefore, a holistic approach is required to address all these aspects together. Sustainability initiatives should be aimed at substituting existing raw materials when manufacturers are confident of the scientific, economic, and regulatory advantages.

*A broad evaluation method must be developed on packaging sustainability. Current studies often have limitations and do not accurately reflect market needs.*

*(Packaging materials supplier)*

*People don't buy packaging. People buy products. Packaging is merely a container. The more interest is shown towards packaging, the less the actual product is considered. The packaging must compliment the product and not become more important than the product itself.*

*(Consulting firm)*

**Future improvements.** Marketing and technological research on more suitable materials and shapes for recycling and smaller environmental footprints are required to promote sustainable packaging. Responsibility policies in different industrial sectors are another goal. On this front, companies deemed that the Conai Consortium plays a crucial role in promoting packaging recycling and have asked the Consortium for help, especially in terms of innovation, knowledge-sharing, and communication, areas that companies alone cannot manage.

*I believe that packaging requirements to ensure product safety is essential.*

*(Packaging user company)*

*Enhancing environmental sustainability does not mean eliminating packaging. It means using more recycled material.*

*(Packaging user company)*

**Packaging sustainability as an area of business opportunity.** Does packaging sustainability provide commercial opportunities? All the respondents gave positive responses, but the "pressure" of sustainability was also felt. There are constraints such as resource scarcity and a more demanding market. Maintaining a good balance between these elements while maximizing efficiency is complex and delicate because many costs affect the entire supply chain. For example, reducing the thickness of packaging may shorten shelf-life and affect logistics management. As sustainability is a critical collective issue, players are hoping for tax incentives to invest in sustainability in this transitional period.

*Sustainability increases costs and adds elements of novelty, but at the same time, induces changes that, if adequately exploited, make the company more competitive. The market will view the changes achieved as a step in the right direction.*

*(Packaging manufacturer)*

*The more you reduce the packaging, the shorter the product's shelf-life. It means that you can save on packaging materials, but it is also true that you must improve your logistics management to ensure that the goods reach the shelves rapidly. Therefore, broadening one's vision can result in higher costs.*

*(Packager)*

**Consortium role.** The respondents understood the importance of the Consortium's actions. The concept of widespread "support" takes on an extended meaning, as it communicates with the stakeholders about the packaging ecosystem. The need for support from the Consortium mainly refers to the issues (innovation, sharing, communication) that companies alone cannot manage. The interviewees appreciated the Consortium so much that some claimed that it fully deserves its good reputation as Italy's best-performing sustainability-focused organization, even better than its European competitors. However, there is always room for improvement: it should strengthen its positioning with the stakeholders, pushing a continuous improvement.

*The Consortium is already working to improve packaging functionality from a communications perspective.*

*(Packaging materials producer)*

*The Consortium should act as a catalyst and host roundtable events between suppliers, manufacturers, and distributors.*

*(Packaging user company)*

#### 4.2. Quantitative Phase

The sample ( $n = 462$ ) reflected the following characteristics: most of the respondents fell into the 36–49 (43.7%) and 50–65 (34.6%) age groups. As regards company position, the respondents were mainly R&D managers (17.1%), marketing managers (16.5%), sustainability and environment managers (11.0%), and chief executive officers or general managers (10.8%). Large companies (>250 employees) accounted for 41.8% of the total, while medium/small companies (<250 employees) accounted for 58.2%. Most of the interviewees had been with their company for a long time (>10 years in 72.9% of the cases). The industries involved were mainly packaging users (food) (30.7%) and packaging manufacturers (29.4%).

The questionnaire asked a specific question to explore the respondents' perception of sustainable packaging's most remarkable characteristics. To simplify the original structure of items, an exploratory factor analysis (EFA) was carried out initially, including the whole set of 15, which was then reduced to nine by excluding those with communality below 0.6 and factor loading below 0.4. After completing the EFA, four factors were extracted (eigenvalues > 1), which explained 68.04% of the total variance (see Table 3).

The data matrix was factorial with good sampling adequacy (KMO: 0.806; Bartlett's test: 0.000 ( $p < 0.05$ )); the factor loadings after varimax rotation (standardized factor loadings) are shown in Table 4.

**Table 4.** Factor loadings (standardized values).

Item	Factor			
	1	2	3	4
Reporting environmental information on product and package	0.744			
Reporting information on the proper use of the product	0.732			
Reporting information on the proper disposal of the packaging	0.717			
With the lowest number of components		0.787		
Reusable		0.761		
With reduced dimensions		0.648		
Made with eco-friendly materials			0.852	
Made with low water and energy consumption			0.763	
Biodegradable and compostable				0.930

Reliability and validity were evaluated using Cronbach's alpha, composite reliability, and average variance extracted, the results of which are reported in Table 5.

**Table 5.** Values of reliability and validity of the constructs.

	Chronbach's Alpha	CR	AVE
Factor 1	0.628	0.774	0.534
Factor 2	0.634	0.777	0.539
Factor 3	0.625	0.790	0.654
Factor 4	Not applicable (Na)	Na	Na

Cronbach's alpha values fell below the accepted threshold (0.7) [67], whereas CR and AVE values appeared satisfactory [68]. Although several studies considered lower alpha values to be acceptable [69], it is essential to note that in the present study, the value of alpha was affected by the number of items, which was purposely reduced to improve the readability of the constructs. Furthermore, the items cannot be considered a scale to measure a strictly unidimensional construct.

Discriminant validity, assessed by comparing AVE's square root with the construct intercorrelation matrix, showed that all the differences were greater than zero, thus satisfying the required condition.

The four factors were interpreted according to their semantic homogeneity and named as follows: (i) "informative packaging"; (ii) "saving packaging"; (iii) "eco-friendly packaging"; (iv) "circular packaging."

A two-step cluster analysis was then performed using the factor scores obtained from the EFA and the company size as grouping variables (hierarchical and k-means).

Three clusters were identified: (i) environment-friendly companies (40.9% of the total, mainly medium/large companies that have pledged to use eco-friendly materials and reduce energy consumption; (ii) information-oriented companies (33.3%, primarily medium/small), whose aim is to inform consumers on packaging disposal; (iii) circularity-oriented companies (25.8%, mainly medium/small) that use biodegradable and compostable materials. All the ANOVA values confirmed the hypothesis of significant differences among the clusters ( $p$ -value < 0.05).

A battery of tests was conducted to determine whether a significant relationship of dependence existed between corporate attitudes toward the environment and sustainable packaging, namely chi-square independence, phi index, and Cramer V. More specifically, companies' sizes (small, medium, and large) and sectors were compared using the following variables: (i) priority attributed to packaging sustainability as a strategic goal (very high; high; medium; low; zero); (ii) level of investments made in sustainable packaging

(more than in the past; equal to the past; less than in the past; no investment); (iii) reasons for investing in sustainable packaging (brand image; part of sustainability strategy; innovation; environment protection; regulatory compliance; unknown, but better to avoid risk; business opportunity); and (iv) probability of positive returns on investments in sustainable packaging (no; yes).

While no statistically significant differences were observed for industrial sectors, company size proved to be a discriminating variable. Regarding the latter, the chi-square test of independence, phi index, and Cramer V are reported in Table 6.

**Table 6.** Chi-square, phi, and Cramer V results (variables vs. enterprise size).

Variable	Chi-Square	Phi	Cramer V
Priority of sustainable packaging	54.285; 0.000 *	0.343; 0.000 *	0.171; 0.000 *
Level of investment	40.405; 0.004 *	0.296; 0.004 *	0.148; 0.004 *
Motives for investing	69.436; 0.000 *	0.388; 0.000 *	0.173; 0.000 *
Trust on positive return	33.695; 0.115 **	0.270; 0.115 **	0.121; 0.121 **

\* Significant ( $p < 0.05$ ); \*\* not significant ( $p > 0.05$ ).

Except for positive returns on investment in sustainable packaging, all the comparisons indicated a significant relationship with companies' sizes, with a reasonable measure of association [70]. In three out of four cases, differences were observed between the companies' sizes and the attitudes toward sustainable packaging.

## 5. Discussion and Conclusions

The study aimed to sketch a unified scenario of the sustainable packaging supply chain, involving a sum of actors, from producers to users. Overall, packaging is a fundamental tool for product safety, shelf-life prolongation, and logistic efficiency. However, technological aspects (new materials, better production, reuse, and recyclability processes) claim radical changes from the packaging ecosystem. More responsive interactions along the supply chain are required to enhance eco-design effectiveness. At the same time, consumers play a crucial role in making packaging sustainability an intrinsic part of the product offering, conceiving this topic as an increase in value rather than an additional cost [71].

The circular economy requires all actors to have shared responsibilities, objectives, and strategies. They need to interface with all subjects' requests and needs, and collaborate to find solutions aimed at optimizing the overall system. For instance, packaging manufacturers and users design their packaging together to meet consumers' needs and sensitivity, and interface the recycling industry for more easily recyclable solutions [72].

The answers to each of the research questions are reported below.

RQ1: What are the leading sustainable packaging future challenges for packaging sustainability, as perceived by the packaging supply chain actors?

There is a growing interest in packaging sustainability. Packaging should be designed to improve product efficiency at a logistic and productive level. Sustainable and protective packaging has recently become a high priority for many consumers. Meanwhile, their willingness to pay a premium price for more sustainable packaging is still to come, in line with previous studies [73,74]. Plastics and sustainability go hand in hand, mainly because consumers are highly irresponsible about disposing of packaging. Consequently, a challenging goal for the future will consist of reconciling technological advances and marketing instances with a cultural shift toward packaging sustainability as a behavioral paradigm.

RQ2: Which activities do the supply chain players undertake to improve sustainable packaging, including the key drivers of sustainable packaging that the companies consider a priority?

Four macro-criteria define sustainable packaging: (i) it must provide consumers with information on how to use the product, as well as how to dispose of the packaging; (ii) it must be ecological; i.e., produced with eco-friendly materials and with small amounts of energy; (iii) it must be inexpensive, by reducing the size of packaging and the raw materials used to produce it, as well as recyclable and reusable; and (iv) it must be circular, thanks to its biodegradability and compostability.

To gain a competitive advantage, the quest for sustainable packaging should involve the entire supply chain. It is not merely a cooperative issue, but also involves the ability to impose economic, organizational, and production constraints from policymakers [75].

Companies will have to merge technological and marketing approaches to ensure that their packaging is sustainable and appreciated by the market, making sustainability an actual competitive advantage [76].

RQ3: What are the companies' perceptions toward the Conai Consortium?

Given the overall positive perception, the Consortium should increase the level of support to its associated companies. These expanded competencies reflect the need for the supply chain to interact and achieve innovation synergies, which requires eco-innovation and communication with consumers and policymakers. The Consortium is expected to produce sustainable transformation plans when companies cannot.

RQ4: Do the attitudes and behaviors toward sustainable packaging change for companies of different sizes and sectors?

Even if slightly, four variables are affected by enterprise size: (i) the strategic priorities associated with sustainable packaging; (ii) the level of investment; (iii) the reasons for investment; and (iv) the expected return on invested capital. Large companies assign a higher priority to sustainable packaging investment more than small/medium size ones; sustainable strategies differ (large companies invest more frequently), as well as the innovation aptitude (small/medium size companies are more innovative); large companies are more optimistic about sustainable packaging's return on investments. Furthermore, larger companies are more inclined to consider sustainability as part of a broader business strategy that creates a competitive advantage, whereas smaller ones view the issue in a tactical sense.

Consequently, it can be affirmed that H1 was supported, whereas H2 was not.

In conclusion, packaging sustainability depends on effective interactions among the supply chain players and requires a dramatic shifting of their vision, with the Consortium acting as a support for communication and innovation. Sustainable packaging needs to be considered a pillar of a long-term sustainable strategy, with the vision of sustainability as a source of competitive advantage and innovation. It means coupling key drivers of packaging sustainability (information, ecology, reduction, circularity) with marketing issues, given that consumers play a crucial role when choosing and disposing of products.

This paper reports on the theoretical and managerial advances, since (i) scholars can establish the pillars of packaging sustainability attitudes and behaviors from the supply chain actors; (ii) practitioners can benefit from the insights obtained when called upon to make decisions regarding the sustainability of packaging, both at intersectorial and intrasectorial levels; and (iii) policymakers can assume a boosting role in packaging sustainability, not only by establishing goals and deadlines, but also favoring innovations and efficiency of the system.

### *5.1. Implications for Theory*

From this study, some theoretical implications for the scientific community can be drawn. First, it is essential to consider industry perspectives to get a clear picture of sustainable packaging's advances and constraints. From a more general perspective, sustainable development aims to replace narrow interests with a collective responsibility, which leads to considering corporate sustainability pivotal for both companies and stakeholders [77].

Second, a sustainable approach to packaging should be based on the concept of value in a complex network [78]. Value can be generated by merging technological, productive,

logistics, and marketing activities, and by monitoring negative and positive externalities (impacts caused by the production of the packaging, reusability, and recyclability) [79].

Finally, the various components of the supply chain (from producers to users) require the assistance of a third-party association—i.e., the Conai Consortium in Italy—to foster innovation, which single companies find difficult to achieve alone.

### 5.2. Implications for Practice

Sustainable packaging should be thin, light, and reusable to reduce the amount of waste it generates, prevent pollution, and minimize energy usage and the consumption of raw materials [80]. This finding is in line with previous studies [81]. However, it was complemented by the specific characteristics that sustainable packaging should possess.

Making packaging as eco-friendly as possible entails correcting upstream errors, which would subsequently become expensive (time and resources) and not always likely to amend. This means that packaging sustainability should be considered a set of coordinated, multidisciplinary, and cross-cutting competencies [40]. Despite its complex implementation, sustainable packaging is no longer just “nice to have”, since it drives product innovation [82] and increases competitiveness [83].

Any sustainable packaging strategy should be read under the lens of its circular value (safety, protection, communication, logistics, waste reduction), as packaging continues to generate possible impacts even after its life cycle has ended.

### 5.3. Implications for Policymakers

The circular economy concept does not work when limited to single companies' actions, but rather in a system based on collaboration and sharing between different supply chains and sectors to reduce the total environmental impact.

Accordingly, policymakers are called to set circularity goals—in 2018, it was esteemed that only 9% of the global economy could be defined as actually circular (Circularity Gap Report)—but also promote innovations by devoting adequate resources allocation policies (i.e., incentives, funds, fiscal treatment) and favoring the speeding up of time-to-market innovations. Furthermore, a converging definition of sustainable packaging should be set to establish legal and compliance requirements precisely, which reduce redundancy of costs on companies' operations.

## 6. Research Limitations and Future Research Development

The present study has some limitations, affecting its generalizability and representing starting points for future research developments.

First, the results refer to the Italian market. A cross-country comparison would be advisable to highlight possible differences or commonality elements.

Second, given the non-probabilistic nature of the sample, the results of the quantitative phase limit the possibility of inference, which in turn could reduce the quality of the gathered information.

Third, the research design was qualitative-oriented, consistent with most of the research questions posed in this study; however, a more in-depth quantitative analysis should be carried out to obtain a better-structured framework.

The paper was prepared for publication during the height of the COVID-19 pandemic. If it were to be written now, the effects of the coronavirus outbreak on companies should be considered. In the future, it would be helpful to determine how companies tackled the crisis and how business strategies have changed as a result of the COVID-19 pandemic.

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