



Department of Management

Ph.D in Management

Cycle XXXIV

Food package sustainability and products' quality: enhancers and barriers towards positive and persistent behavioral shift

Matteo De Angelis

SUPERVISOR

Carmela Donato

CO-SUPERVISOR

Alba D'Aniello

CANDIDATE

Academic Year 2022/2023

Food package sustainability and products' quality: enhancers and barriers towards positive and persistent behavioral shift

Final Thesis
Ph.D. in Management
Department of Business and Management
LUISS Guido Carli
XXXIV Cycle

Supervisor:

Prof. Matteo De Angelis

Co-supervisor:

Prof. Carmen Donato

Acknowledgments

As I approach the end of one of the most challenging journeys of my life, I feel it necessary to thank a few people without whom none of this would have been possible.

First and foremost, I am extremely grateful to my supervisors, Prof. Matteo De Angelis and Prof. Carmen Donato for their essential support and patience during my PhD.

I'm extremely thankful to Matteo, for his extraordinary ability to understand my needs and feelings during these tough years. You have forgiven my mistakes and emphasized my strengths. For this, and many other reasons, to me you are an extremely inspiring mentor: you're an example of passion, efficiency and proactivity, and I truly hope that one way or another you'll be proud of what I will become in the future (wherever life will take me!).

I will never have enough words to express my gratitude to Carmen. Actually, I truly believe that through your empathy, tolerance and support you literally pulled me out of a black hole. You believed in me when I didn't, and I really think I will never be able to get you back what you gave to me.

A special dedication goes to Prof. Michele Costabile, the person who inspired me to pursue this career. Since I met you as a student and even more when I started working with you five years ago, I had the great chance to learn a lot from your curiosity and perseverance. So, thank you for your precious wisdom and even more for your confidence in my skills. I wish that one day I could inspire someone else the way you inspired me, and you keep motivating young students and professionals.

I would also like to thank Prof. Simona Romani for letting me grow through different activities and for her ability to appreciate the uniqueness of any individual path.

Throughout the years, I had the pleasure to share moments, thoughts, worries, ups and downs, with unforgettable people, that contributed in different ways to my personal and professional growth.

A huge thank you goes to Luca (or should I say Giuà?): the way you completely dedicate yourself to your work, with accuracy and perseverance makes you a "one of a kind" that I'm glad to

share my days with. Most of all, you're a great partner in chocolate crimes, tennis opponent, "art" commentator and friend, that I would really love to invite to my 60th birthday.

With Alessandro and Chiara, I shared the most beautiful period of this PhD program: you made the endless hours of lessons the best place where I could stay and have fun, no matter how difficult they were.

Thank you, Antonella, because from the very beginning you were one of my main reference points, always ready to listen and talk.

A super thank you goes to Anna, who helped me a lot during all these years. I could say it was friendship at first sight and I hope to see you again soon (being more relaxed than ever)!

Finally, I would like to thank my family for their precious support during hard times, which since 2020 went even harder: you are the reason why I'm able to overcome my fears, anxieties and limits, because you are my example of strength as well as my safe harbor.

The last thank you goes to the one person that really knows what I went through in the last years. So thank you, Paolo, for your patience and love during never-ending days and sleepless nights. You're the best person I could ever ask for, my best friend and my first supporter. Hope this is just the first of many other roads we'll walk together.

I would have loved to share this moment with you, grandpa but be sure that you've always been in my heart and mind in the most difficult moments. I'm sure that it's you, nonna Lili, nonno Cucù and nonna Alba that showed me the way when I felt lost.

Grazie.

TABLE OF CONTENTS

Introduction	7
<i>Paper I - It's all about that pack: detecting patterns in consumers' evaluations of food and beverages in sustainable packages. A systematic literature review and bibliometric analysis....</i>	11
Abstract	11
1. Introduction	12
2. Research Methodology.....	15
2.1 Identification of records and criteria of inclusion.	15
2.2 Data cleaning process.....	16
2.3 Bibliometric analysis.....	18
3. Main findings	20
3.1 Bibliographic data analysis	20
3.1.1 Cluster 1 – Consumers' evaluation of sustainable packaging.....	21
3.1.2 Cluster 2 – Environmental performance of sustainable packaging.....	22
3.1.3 Cluster 3 – Packaging material and circular economy.....	22
3.1.4 Cluster 4 – Packaging innovation in the food and beverage industry	23
3.2 Results from the qualitative synthesis of papers	23
3.2.1 A comprehensive definition of Sustainable Food Packaging.....	25
3.2.2 Positive (vs. negative) evaluations of sustainable food packaging.....	29
4. Emerging topics in sustainable food packaging literature and future research questions	37
5. General discussion and conclusions.....	41
References	44
Annex A – Qualitative Synthesis of Selected Papers	55
<i>Paper II - Is it recycled or recyclable? Improving consumers' perceptions of recycled plastic packages for food products.</i>	72
Abstract	72
1. Introduction	73
2. Conceptual Background.....	77
2.1 Package circularity and food quality perceptions: the mediating role of contamination	77
2.2 The moderating role of temporal orientation.....	80
2.3 Overview of the current research	82
3.1 STUDY 1.....	82
3.1.1 Participants, design and procedure.....	82
3.1.2 Results	83
3.2 STUDY 2a.....	84
3.2.1 Participants, design and procedure.....	84
3.2.2 Results	85
3.3 STUDY 2b	86
3.3.1 Participants, design and procedure.....	86
3.3.2 Results	87
4. General Discussion and Conclusion.....	88
4.2 Limitation and Direction for Future Research	91
References	94
Appendix A	102
Stimuli used in study 1	102

Appendix B	102
Stimuli used in study 2a.....	102
Appendix C	103
Stimuli used in study 2b	103
<i>Paper III - Tell me more and make me feel proud: the role of eco-labels and informational cues on consumers' food perceptions</i>	104
Abstract	104
1. Introduction	105
2. Theoretical background and hypothesis development	108
2.1 Eco-labels and food perceptions	108
2.2 The mediating role of pride	110
3. Pretest	113
3.1 Pretest procedure and measures	113
3.2 Pretest results.....	114
4. Experimental study	116
4.1 Design and measures.....	116
4.2 Experimental study method	117
4.3 Experimental study results and hypothesis testing	118
5. Discussion and conclusions	123
5.1. Limitation and future research direction	126
References	128
Appendix 1	135
Appendix 2	135

Introduction

In recent years, as environmental issues are causing unprecedented consequences to the global ecosystem, consumers are increasingly expressing concern about the ethicality of their consumption choices, especially in the context of Fast-Moving Consumer Goods (FMCGs) and daily shopping behavior. The food and beverage industry has a huge environmental impact, accounting for most of the global greenhouse gas (GHG) emissions (26% of total global emissions), land and freshwater use (50% of free lands and 70% of water are employed for agriculture), as well as pollution, climate change and waste (Ritchie and Roser, 2020; Notarnicola et al., 2017). Being one of the most environmentally impactful sectors, it is at the center of many eco-friendly actions, from institutional intervention to various corporate initiatives. As a result, retailers and food producers are restructuring their strategies to become more environmentally responsible. Packaging sustainability is one of the possible answers, which is receiving considerable attention among scholars, firms, policy makers, which calls for alternatives to conventional packaging, defined as single-use item that is thrown right after reaching the customer or after product consumption (Petkoska et al, 2021).

The present work draws on the awareness that beyond firm efforts, it is customer choice which ultimately drives the development of a greener market. Indeed, although consumers may express growing concern and desire for a world in which everyone is more conscious of the impact of personal decisions on the whole society, major studies on sustainable consumption confirm that the proliferation of pro-environmental choice is marginal. Literature shows that this is mainly due to (a) low levels of awareness of greener options; (b) inability to correctly assess the environmental impact of products; (c) motivational complexity (Moisander, 2000) of green consumption. The latter indicates that when trading-off among various attributes, individual differences lead to different evaluations of eco-friendly characteristics, as well as different perceptions in terms of products evaluation. In this perspective, this work focus on the communicative function of packaging, which allows to inform and further educate consumers about sustainable attributes that would be otherwise impossible to assess. Therefore, convincing them to choose sustainably packaged food may still be a

challenge. First, because they have limited knowledge of what sustainability means for food packaging and this may lead them to suboptimal choices (Otto et al., 2021; Ketelsen et al., 2020). Second, and related to the first point, there might be discrepancy between company and consumer perception of what sustainable packaging is (Liem et al., 2022). As literature on customer acceptance of food and beverages in eco-friendly packaging is steadily growing in the last years, it is often fragmented, and it provides conflicting findings in terms of negative and positive consumers' evaluations.

Based on what has been discussed so far, the main aim of this dissertation is to explore consumers' evaluations of food and beverages which are offered in sustainable packaging, broadly defined as a package that has a lower environmental impact compared to conventional alternatives. The work is divided into three main papers, which are briefly summarized below.

Paper I, titled "*It's all about that pack: detecting patterns in consumers' evaluations of food and beverages in sustainable packages. A systematic literature review and bibliometric analysis*", has the goal to introduce the reader with the topic of sustainable food packaging from consumers' perspective. Through a systematic literature review and a bibliometric analysis the paper aims to aggregate relevant knowledge about sustainable food packaging with three main goals: (1) to define a clear taxonomy of sustainable packaging attributes for the Food&Beverage sector; (2) to uncover drivers of positive (vs. negative) products evaluations and (3) to identify the topics that are recently gaining more attention, in order to detect potential avenues for future research. Results confirm that consumers' assessment of packaging's sustainable performance is hard, but at the same time packaging cues are effective tools to recognize eco-friendly attributes, both implicitly (e.g., structural and graphical cues such as material and color) and explicitly (e.g., graphical, verbal, technology-enabled: eco-labels, claims or QR codes). In general, consumers positively evaluate food in eco-friendly design. However, negative responses are detected in few recurring cases: (1) when the information displayed is vague or unclear or when the consumers are not aware of its meaning, benefits and risks (e.g., innovative solutions); (2) when there is a perceived mismatch between

explicit and implicit packaging cues; (3) when multiple attributes (e.g. sustainability and healthiness) are signaled at once. Finally, we propose relevant potential avenues for future research.

Paper II, titled “*Is it recycled or recyclable? Improving consumers’ perceptions of recycled plastic packages for food products*”, focuses on a specific category of sustainable food packaging - namely, intrinsic structural cues and circularity strategies - comparing “recycled” and “recyclable” solutions. While recyclability has often been indicated by consumers as a key attribute of a sustainable food packaging, few works demonstrate that recycled materials may cause a detrimental effect on perceived food quality, explained by fear of contamination issues. However, the differential effectiveness of these two alternatives is quite overlooked by previous research. Therefore, building on theories on temporal orientation we develop a model to mitigate this negative effect. Across three experimental studies we investigate how packaging circularity may affect consumers’ evaluation of food products showing that: (a) recycled plastic is perceived as contaminated, thus being detrimental for food quality evaluations (b) when people are more present-focused (than future-focused) the negative effect of recycled packaging on food quality is mitigated; (c) the presence of a temporal-oriented appeal, which highlights that the sustainable activity has already been performed, mitigates negative quality perceptions. In general, partially in contrast with previous prediction about temporal oriented cognition, we thus highlight a case in which even a present-focused orientation can be effective (i.e., for recycled materials). Our findings contribute to the theoretical understanding of consumer responses to circular claims on food packages providing some useful managerial insights to improve consumers’ evaluation of food, in order to avoid contamination inferences when it is packaged in recycled plastic.

Finally, paper III, titled “*Tell me more and make me feel proud: the role of eco-labels and informational cues on consumers’ food perceptions*”, aims to identify the impact of food-related and packaging-related eco-labels on consumers' perceptions of food quality and safety when an ecological claim, which explains the eco-label meaning, is provided. Therefore, it focuses on the combination of graphical cues (eco-labels) and verbal cues (ecological claim). Indeed, sustainable cues on food

packaging, can either signal ecological attributes which are intrinsic to the product itself (e.g., organic ingredients, free-from chemicals, responsibly sourced) or to its packaging (e.g., no over packaging, use of sustainable materials) (Magnier & Crié, 2015). While previous research has produced contrasting results for the influence of food-related eco-labels on food perceptions (e.g. Sörqvist et al., 2013, 2015; Vitale et al., 2020; Van Doorn and Verhoef, 2011; Delmas and Lessem, 2017), the “halo” effect of packaging-related eco-labels on food has been overlooked (Donato et al., 2021; Marozzo et al., 2020). Therefore, this paper aims to clarify whether eco-labels can truly be effective in triggering positive food evaluations in terms of quality and safety, and which type of eco-label (i.e. food-related, MSC vs packaging-related, FSC) is more effective and under which circumstances. One survey (N=472) and one experimental lab study - 2 (eco-label: MSC vs FSC) × 2 (ecological claim: present vs absent) between-subjects design - were used to test the hypotheses drawn from the elaboration likelihood model. When the ecological claim is absent, only food-related eco-labels were found to generate a higher food evaluation. However, when the ecological claim is present, both eco-label types (i.e. food-related and packaging-related) increased food perceptions of quality and safety because of higher feelings of pride. From a theoretical perspective, this research identifies both food- and packaging-related eco-labels as extrinsic cues able to affect consumers' perception of food quality and safety.

Paper I - It's all about that pack: detecting patterns in consumers' evaluations of food and beverages in sustainable packages. A systematic literature review and bibliometric analysis.

Abstract

In recent years, sustainable food packaging is receiving considerable attention from practitioners, scholars, policy makers and consumers. However, the way in which consumers evaluate food and beverages when they are marketed in eco-friendly packages remains unclear, as no previous research tried to bridge the gap between conflicting results.

Through a systematic literature review and a bibliometric analysis, informed by Web of Science and Scopus databases, the present work aims to collect and systematize relevant knowledge about sustainable food packaging with three main goals: (1) to define a clear taxonomy of sustainable packaging attributes for the Food&Beverage sector; (2) to uncover drivers of positive (vs. negative) products evaluations and (3) to identify the topics that are recently gaining more attention, in order to detect potential avenues for future research.

In line with the analytical approach to packaging research, we identify four packaging cues that allows to recognize eco-friendly attributes, both implicitly (e.g., structural and graphical cues such as material and color) or explicitly (e.g., graphical, verbal and technology-enabled cues such as eco-labels, claims or QR codes). Results reveal that consumers fail to assess sustainable performances of food packages. While literature confirms positive reactions to sustainable packaging design, negative responses are detected in few recurring cases: (1) when consumers are not aware of benefits and risks related to new packaging solutions; (2) when there is a perceived mismatch between explicit and implicit packaging cues; (3) when multiple attributes (e.g., sustainability and healthiness) are signaled at once. The findings highlight how sustainable food packaging is an interdisciplinary phenomenon that is steadily gaining attention, providing fertile ground for future research.

Keywords Sustainable food packaging; food evaluation; consumers perception

1. Introduction

The food industry significantly contributes to global environmental impact (Ritchie and Roser, 2020; Notarnicola et al., 2017) and packaging waste is a serious side-effect of consumption (Ketelsen et al., 2020). Only in 2018, European consumers produced around 174 kilograms of packaging trash per capita, for a total of 77.5 million tonnes of waste (Eurostat, 2021). Consequently, intervention on packaging design is prioritized, as packaging-related environmental concerns are affecting the political agenda of several institutions worldwide.

Food producers and retailers are forced to consider environmental responsibility as a crucial component of their strategy (Magnier and Crié, 2015; Steenis et al., 2017). However, when it comes to food packaging, several considerations should be taken into account to reduce its impact before and after consumption, as a sustainable package allows to serve multiple benefits such as protecting and preserving food quality and safety (i.e., avoiding waste), facilitating transportation throughout the supply chain, and ensuring sustainability in the post-consumption phase (e.g., through recyclable materials) (Lindh et al., 2016; Granato et al., 2022).

Indeed, various alternatives to conventional packaging are already available on the markets: from more sustainable materials (e.g., paper-based packaging; Lignou & Oloyede, 2021, Olsmat et al., 2015) to circular solutions (e.g., recycled and/or recyclable materials; Rokka & Uusitalo, 2008; Testa et al., 2021) up to the most advanced technological innovation (e.g., active and intelligent packaging, Cammarelle et al., 2021). However, the heterogeneity of proposed solutions, usually signaled through visual cues (e.g., Rees et al., 2019), makes it unclear whether such strategies effectively represent suitable substitutes for conventional food packaging from the consumers' standpoint, which still represent a main challenge to achieve real environmental improvements (Chirilli et al., 2022).

Literature about sustainable food packaging (e.g., Vila-Lopez & Küster-Boluda, 2020) has addressed a wide variety of research questions, but it lacks a clear framework, which should allow researchers and practitioners to clearly identify the current knowledge base, in terms of core themes and findings.

Therefore, developing a deeper understanding of consumers' perceptions of sustainable food packages is a complex and relevant phenomenon that strongly influences world's sustainable development, thus representing a valuable and relevant area of research. Nonetheless, previous literature is fragmented and sometimes conflicting, which raises the need for a more systematic approach and stronger empirical evidence of findings.

The purpose of this article is to offer a review of research about sustainable food packaging, through the lens of consumers' evaluation of such products. We aim to collect, frame, and analyze the most relevant studies, systematizing existing literature in a novel way, namely exploring drivers and barriers for positive and negative consumers' evaluation. Therefore, the present research aims to answer the following research questions:

***RQ1** – What is a comprehensive definition of Sustainable Food Packaging that consumers should be aware of?*

***RQ2** – Are there recurring patterns driving positive (vs. negative) food and beverage evaluations when the packaging signals its sustainable attributes?*

***RQ3** - Which are the most recent trends in Sustainable Food Packaging literature and what are the future research opportunities?*

Through the analysis of relevant research published in peer-reviewed journals between 2013 and 2022, identified through Web of Science and Scopus, we aim to comprehend and clarify the influence of sustainable packaging on consumers' choice, aggregating results from different studies to understand when and how eco-friendliness may bring different results – i.e., whether it negatively or positively affects products' evaluation. Moreover, the study is complemented by a bibliometric analysis, performed through the VOSViewer Software (van Eck and Waltman, 2010), which allowed to create a keywords co-occurrence map.

Based on marketing literature and related fields we develop a Sustainable food packaging Taxonomy to classify the main packaging cues that allow to recognize eco-friendly attributes, both implicitly (e.g., structural and graphical cues such as material and color) or explicitly (e.g., graphical,

verbal, technology-enabled: eco-labels, claims or QR codes) (e.g., Magnier and Crié; 2015). Results confirm consumers' preference for sustainable packaging compared to conventional alternatives (Steenis et al., 2017; Magnier et al., 2016; Donato et al., 2021) but they also reveal that consumers' assessment of packaging's sustainable performance is hard. Indeed, they often tend to fail to assess the environmental performance of package from a life cycle perspective (Steenis et al., 2017; Otto et al., 2021; Granato et al., 2022) as they usually focus more on the post-consumption phase (Lindh et al., 2016; Liem et al., 2022) and less on other packaging functions, such as sustainable production processes or effective food protection. Moreover, negative responses are detected in few recurring cases: (1) when consumers are uncertain of potential benefits and risks of the new package; (2) when they perceive a mismatch between extrinsic signals and intrinsic attributes; (3) when too many attributes are communicated jointly (e.g., pack sustainability and food healthiness).

Results contributes to both literature about sustainable packaging (e.g., Boz et al., 2020) and food consumption (e.g., Campbell-Arvai et al., 2014) clarifying the role of ecological food packaging in shaping products evaluation and choice, highlighting when and how it may even boost food and beverage evaluations and choice. In this sense, this research provides practitioners with suggestions to deal with shortcomings in consumers' evaluation, in terms of successfully implementing redesign strategies as well as effectively communicating package sustainable attributes, to enhance positive responses and positive behavioral change. Finally, this work could support scholars interested in the field to identify under-investigated topics and undertake new research projects based on a clear framework which is exclusively focused on food and beverages.

The remainder of this article is organized as follows: first, we illustrate the methodology applied to develop our systematic literature review and bibliometric analysis (Linnenluecke et al., 2020). Second, we introduce the main findings starting from the keywords co-occurrence maps, from which we highlight the four key topics of sustainable food packaging literature: (1) consumers perceptions; (2) environmental performance of sustainable packaging; (3) package material and circularity; (4) packaging innovation. Then, based on the analysis of identified papers we propose a taxonomy for

sustainable food packaging which bridge together the perspectives of packaging life cycle (Boesen et al., 2019), packaging functions (Lindh et al., 2016; Granato et al., 2022) and intrinsic and extrinsic packaging cues (Magnier and Crié, 2015). Then, we classify and report literature based on whether consumers' evaluation and choices of food were either positively or negatively affected by the ecological attribute of package. Furthermore, we identify most recent trend in sustainable food packaging literature, and we finally conclude our work with a general discussion of our major findings deriving highly potential and relevant areas for future research.

2. Research Methodology

The current study draws on the consideration that a comprehensive literature review is extremely important to gather existing knowledge and assess the state of the art of a specific subject (Linnenluecke et al., 2020). To ensure a rigorous and replicable examination of available literature about consumers' evaluation of food and beverages in sustainable packages, this work follows the guidelines about theme-centric systematic reviews and bibliometric analysis proposed by Linnenluecke et al. (2020), which are described in this section.

2.1 Identification of records and criteria of inclusion.

The databases selected for the identification of records were Web of Science and Scopus, which allow to search for publication through keywords used in paper titles, abstracts or author keywords and have been widely used by previous research. The author decided to look for articles published in the last 10 years, from 2013 to 2022, to gather an updated but broad overview of the phenomenon.

The selection of search terms was informed by previous literature on the topic (Afif et. al, 2022; Ketelsen et al., 2020; Boz et al., 2020; Popovic et al., 2019) and included keywords related to sustainable packaging design and consumers' evaluation of products, resulting in the following Boolean phase of advanced search: (TS=(food OR beverage AND pack*) AND TI=(sustain* OR

environment* OR eco-friend* OR ecolog* OR green AND pack*) AND AB=(consum* AND pack*)).¹

Furthermore, the review was limited to peer-reviewed journals, excluding other types of work, such as books, chapters, conference papers, abstracts and proceedings, editorials, research notes, working papers and dissertations (e.g., Afif et al., 2022). Similarly, papers that were not written in English were excluded from the analysis. The search procedure was comprehensive and can be easily reproduced. As a first result, a total of 442 studies were retrieved from Web of Science and a total of 380 studies were retrieved from Scopus. After completion, references were exported to Excel for the data cleaning process.

2.2 Data cleaning process.

Once the range of suitable studies was identified, the first step was aimed at removing duplicates (N=79), resulting in a total of 743 studies. Secondly, *false positives* were detected and removed through the application of different criterion defined and carefully applied by the researcher, through a step-by-step approach (e.g., Silva and Palsson, 2022). As sustainable food packaging is an interdisciplinary phenomenon, the first criterion was aimed at excluding papers published in journals where the scope was undoubtedly far from the main goal of this work (e.g., chemistry, biology, medicine), which is to focus on consumers' evaluations of food and beverage products driven by sustainable packages.

However, after applying this criterion, many articles were still far from the research goal and new criteria were needed to restrict the sample to relevant works. Therefore, in order to further refine the database, titles and abstracts were scanned in order to apply criterion 2, 3 and 4: through the application of the second criterion, we excluded article that were far from our goal, but not easily

¹ The advanced search query used in the Scopus Database was: TITLE-ABS-KEY (food OR beverage AND pack*) AND TITLE-ABS-KEY (sustain* OR eco-friend* OR environment* OR ecolog*) AND TITLE-ABS-KEY (consum* AND perception OR evaluation) AND PUBYEAR > 2012 AND PUBYEAR < 2023 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")). Scopus Query link is available here: [Query results Scopus](#); in Web Of Science the search query was: (TS=(food OR beverage AND pack*) AND TI=(sustain* OR environment* OR eco-friend* OR ecolog* OR green AND pack*) AND AB=(consum* AND pack*)) Web of science Query link is available here: <https://www.webofscience.com/wos/woscc/summary/c47e23d2-3c88-4867-8b76-57070e14778e-7ed4a614/relevance/1>.

detectable through the journal scope. The third, fourth and fifth criteria rejected publications that examined packaging from views beyond the scope of this literature review. After this cleaning process, the sample included 84 studies assessed for eligibility. Details of article exclusion are summarized in Table 1.

CRITERION	RATIONAL	N ARTICLE REMOVED
1	Exclude papers published in journals where the scope is undoubtedly far from the topic (e.g., chemistry and pharmacy, medicine, ergonomics, biology and microbiology, public policy, other industry-specific journals).	135
2	Exclude papers focused on topics that are not relevant for the purpose of analysis (e.g., Consumers Packaged Goods of other industries, logistics and supply-chain management, waste management, foodtech and sustainable innovation, regulatory aspects of innovative packaging solutions).	200
3	Exclude papers focused on other aspects of food industry sustainability (eg., food innovation, food imperfections, assessments of packaging effectiveness in terms of food protection and quality, shelf-life extensions, or environmental impact of consumption choices).	203
4	Exclude paper based on title ad abstract screening, as they were on product or package features not directly related to package sustainability (e.g., color, brands, verbal claims).	55
5	Exclude all the remaining studies that do not expressly refer to consumers perceptions and choice of food products with respect to sustainable food packaging.	66

Table 1 - Detail of exclusion criterion

Finally, we went through a cited reference check, also known as backward snowball sampling method (Wohlin, 2014), to ensure that no important contributions were missed, resulting in 13 additional articles (Linnenluecke et al., 2020). Once the data cleaning process was completed the final database included in the qualitative synthesis was made of 55 studies published in 28 peer-reviewed journals from 2007 to 2022. Figure 1 summarizes the systematic review strategy.

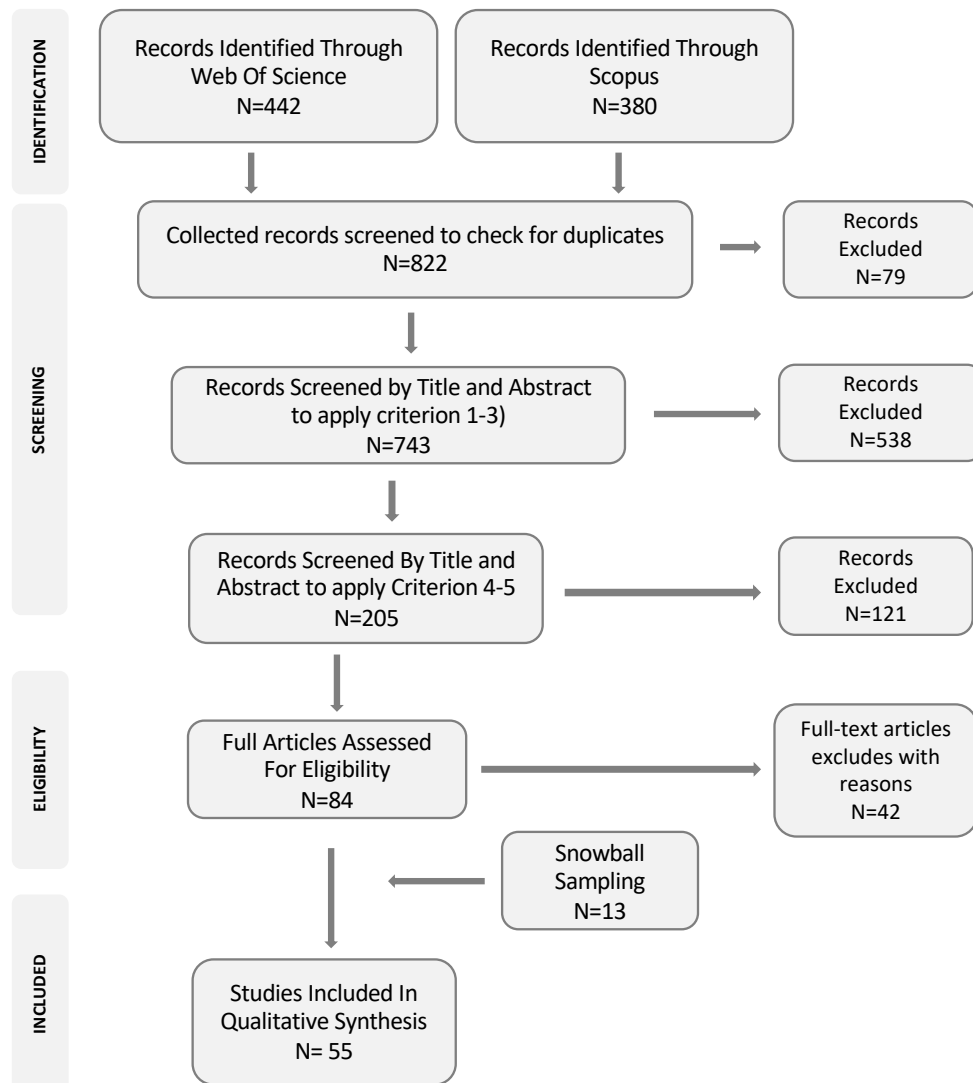


Figure 1 –PRISMA flow diagram of the systematic review process. (Moher et al., 2009).

2.3 Bibliometric analysis.

Bibliometric analysis enables research on large sets of bibliographic data, and it has proven to be an effective tool to visualize interrelations among published journal articles, allowing researchers to map how topics relates to each other (i.e., in terms of co-citation, highly cited works, or keywords co-occurrence; van Eck and Waltman, 2010; Linnenluecke et al., 2020). To perform the analysis, the VOSviewer (version 1.6.18) software was selected (e.g., Andersen, 2019) as it is suitable for visualizations of any type of bibliometric networks (van Eck and Waltman, 2014).

As the goal of this paper is to provide a comprehensive theme-centric review, the bibliometric analysis was focused on *keywords co-occurrence*, which is based on VOSviewer’s text mining

functionality and indicates the number of publications in which the two keywords occur together (van Eck and Waltman, 2014). The software creates a network map made of nodes (i.e., relevant keywords) and edges (i.e., relationships between nodes) extracting information from English-textual data. As VOSviewer adopts a distance-based approach, the distance between nodes approximately indicated the relatedness of nodes: thus, the closer the nodes, the higher the relatedness between the keywords (van Eck and Waltman, 2014).

To perform the analysis, we followed the detailed step-by-step guide proposed by van Eck and Waltman (2014, pp. 22-23) to ensure the outcome replicability. Before conducting the analysis data retrieved from Web of Science and Scopus were cleaned and unified in Excel, thus exported as CSV file. The followed steps were: (1) Create a map based on text data; (2) Read data from bibliographic database files; (3) Select the .csv file in which both Scopus and Web of Science records were unified after the data cleaning process; (4) the Title and abstracts fields option was selected, selecting the options “ignore structured abstract labels” and “ignore copyright statements”; (5) the binary counting method was selected, so that the number of times the same noun occurs within the same publication plays no role in the analysis; (6) a thesaurus file was created, in order to inform the software about some equivalent keywords (e.g., “WTP” should be considered as the same as willingness to pay); (7) finally, the default options for minimum number of co-occurrence and number of nouns to include in the network (60% of the total) was used, in order to ensure that only the most relevant keywords were selected for the analysis. Moreover, a final screening of the resulting terms was performed, to exclude general keywords such as “methodology”, “results”, “future research”, “respondent”, “sample” which provide little information and would have reduced the usefulness of the map (van Eck and Waltman, 2022). Finally, the software generated the map and it also provided information about terms occurrence (i.e., the number of documents in which a term occurs at least once) and a relevance score (i.e., how topic-specific a term is).

3. Main findings

3.1 Bibliographic data analysis

Figure 2 shows the final visualizations of the keywords co-occurrence network. As already explained in the method section, VOSviewer adopts a distance-based approach, so that nodes (i.e. keywords) that are displayed closely indicates higher degree of relatedness between the two terms (van Eck and Waltman, 2014). The visual map offers a quite consistent picture of the sustainable food packaging literature. The size of the circles reflects the frequency of terms, while the weight of connecting line indicates the number of articles in which the keywords co-occur. Terms that frequently co-occur are assigned to the same cluster, which is indicated by the color. As it is possible to see from the figure, the software grouped the terms into four clusters of significant size, which represent the four main fields – strictly interrelated - addressed by sustainable food packaging literature.

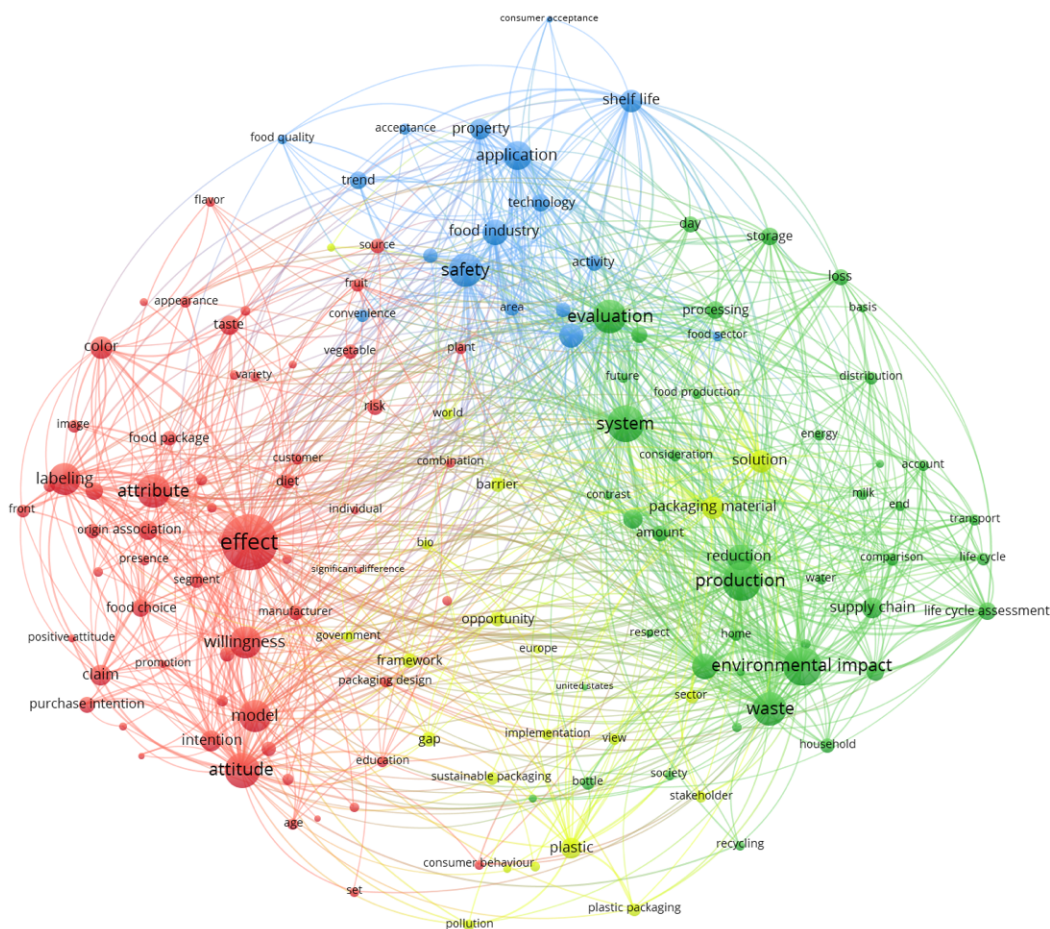


Figure 2 - VOSviewer results of bibliometric analysis of keywords (N=142, 4 clusters)

1. The red cluster, on the left side of the graph, is about consumers evaluations of packaging;
2. The green cluster, on the right, is about the assessment of environmental performance of sustainable food packaging;
3. The yellow cluster, in the lower central part of the map is about packaging material and circularity;
4. The blue cluster, located in the upper section of the network, is about packaging innovation in the food and beverage industry;

Hereafter we will briefly describe each cluster.

3.1.1 Cluster 1 – Consumers’ evaluation of sustainable packaging

The biggest cluster (N=61 terms) is about consumers’ evaluation of food packaging, and it includes the 43% of all the keywords in the map. As our literature review is extremely focused on consumers’ perceptions this result was not unexpected. The terms “effect” (o=115, RS=0.8), “attitude” (o=66, RS=0.78), “willingness” (o=58, RS=10.067), “preference” (o=57; RS=14.21) and “attribute” (o=62; RS=1.124) are dominant in terms of occurrences. The same can be noted for some packaging-related terms: “attribute” (o=62; RS=1.124) “labeling” (o=57; RS=14.21), “color” (o=39; RS=14.52), “claim” (o=36; RS=0.75) and “design” (o=17; RS=18.6). The relevance score informs about how each keyword represents a specific topic covered by the text data so that when the relevance score is low the term seems to be general and not extremely representative of the topic. Indeed, the results suggest that the terms “labeling”, “color” and “design” are extremely important in this field, and this result is coherent with the analytical stream of literature about sustainable food packaging which focuses on specific characteristics of the package design (e.g., Magnier et al., 2015; Steenis et al., 2017). It is also worth to mention all the terms related to food products’ characteristics such as “taste” (o=32; RS=10.7), “freshness” (o=14; RS=11.3), “healthiness” (o=29; RS=0.92), “flavor” (o=66; RS=0.99). Finally, the cluster also includes terms about consumers’ individual characteristics (e.g., age, gender, education and other demographic characteristics).

3.1.2 Cluster 2 – Environmental performance of sustainable packaging

The second cluster in terms of dimension (n=43 items), including 30% of terms in the map, is related to the assessment of the environmental performance of packaging. The dominant keywords are “environmental impact” (o=72, RS=0.85), “evaluation” (o=62, RS= 18.7), “waste” (o=62, RS=0,9), “production” (o= 72, RS=0.49), but also “processing”, “storage”, “distribution”, “supermarket”, “household” and “food waste” which highlight the importance of considering package performance throughout the whole supply chain when assessing its environmental performance. The most central keyword in cluster 2 are “system”, with its 134 links and a total link strength equal to 720 (o=69, RS=10.11) and the already mentioned “environmental impact” and “production”. Moreover, keywords in cluster 2 such as “life cycle assessment” and “comparison” refer to the literature that confront the actual environmental impact of packaging with other stakeholders’ evaluations and behaviors (e.g., Herbes et al., 2018; Boesen et al., 2019; see Otto et al., 2021 for a review).

3.1.3 Cluster 3 – Packaging material and circular economy

Cluster 3 (N=21) is about packaging material and the subfield of circular economy, and it includes almost 15% of all the keywords in the map. As shown in *figure 2* this cluster serves as a bridge among the other clusters in exam. Many of the keywords contained in the yellow bundle are strictly linked to keywords from the other three clusters. For example, the most central term is “packaging material” (o=37; RS=18.5) that has 114 links within all the clusters. It is very important to mention that this cluster focuses on institutional interventions as the keywords “framework”, “government”, “stakeholder”, “transition”, “pollution”, “World” and “Europe” are included in this cluster. Consequently, it is not surprising that it highlights a focus on a specific material, which is “plastic” and few suitable alternatives proposed as solution, as for example “bio” materials and “recyclability”. This outcome is consistent with literature on packaging materials, which often emphasizes the importance of reducing plastic consumption, in accordance with governmental pressure, which is

gaining considerable attention recently (e.g., Hermann et al., 2022; Koenig-Lewis et al., 2022; De Marchi et al., 2020).

3.1.4 Cluster 4 – Packaging innovation in the food and beverage industry

Cluster 4 (N=17) is about innovation in the food and beverage packaging industry. Indeed, it mainly focuses on “technology” (o=29, RS=10.59) and “consumers’ acceptance” (o=28, RS=10.96) of innovation. The most central keywords in this cluster are “safety” (o=61; RS=14.43), “food quality” (o=14; RS=0.89) and “shelf life” (o=37; RS=11.57) as much of the literature on packaging innovation focuses on extending the food’s shelf life while still ensuring the quality and safety of the product itself (see Yan et al., 2022 for a review on this specific field).

3.2 Results from the qualitative synthesis of papers

While the cluster analysis allowed to identify the four core themes addressed by Sustainable Food Packaging literature, the qualitative synthesis of papers is exclusively focused on cluster one: namely, consumers’ perceptions of food and beverages in sustainable packages. In this paragraph we summarize some key characteristics of the papers selected for the analysis, which have been classified according to year of publication, theoretical background, numbers of coauthors, and sampling methodology. The final database of papers included in the qualitative synthesis confirms that the role that sustainable food packaging serves in shaping consumers’ perception of food is a recently developed topic which is gaining growing attention: we identified 55 studies published between 2008 and 2022 (Table 2). In other words, almost 71% of studies included in the analysis were published during the last 5 years and 27% (i.e., 12 articles) of identified papers were published only in 2022.

YEAR OF PUBLICATION	N OF STUDIES INCLUDED
2007 - 2012	3
2012-2017	13
2018-2022	39

Table 2 – Number of records per year of publication

Moreover, regarding the geographical area of the data collection, 33 of the 55 studies were conducted in Europe, followed by the United States (N=5), United Kingdom (N=4), India (N=2) and Canada, China and Mexico (N=1 each). Only 5 works collected responses from 2 or more countries worldwide.

In terms of theoretical foundation, summarized in table 3, we identified 4 main areas, 3 of which are in line with results of Ketelsen et al. (2020)².

THEORETICAL FOUNDATION	N of Articles
Theories On Attitude-Behavior Relationships Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (TPB) (Ajzen, 1991, Ajzen, 2011)	11
Theories on consumer preferences and willingness to pay Microeconomic foundations, i.e. utility maximization and/or Random Utility Theory (McFadden, 1974)	18
Theories on cue utilization and signaling Information economics, e.g., Cue Utilization Theory (Olson and Jacoby, 1972) and Signaling Theory (Spence, 1973, Stigler, 1961)	7
Theories on Cognitive processes and evaluations Dual-process theories (Chaiken, 1987; Petty & Cacioppo, 1981); Construal level theory (Liberman and Trope 1998, Trope et al. 2007); Dual Attitudes theory (Wilson et al., 2000)	9
Other theoretical foundations	10

Table 3 – Theoretical foundation (rielaboration of Ketelsen et al., 2020)

Finally, before going through the detailed synthesis of content analysis, it is important to highlight that vast majority of articles rely on a quantitative research methodology. Differently from Ketelsen et al., (2020) we observe a definite increase in the number of experimental studies. Results are summarized in table 4.

² For a detail of constructs and corresponding theoretical foundations see the paper Annex A, which reports the complete qualitative syntheses of papers.

RESEARCH METHODOLOGY	N of Articles
Surveys	20
Experiments	27
Eye-tracking	1
Implicit Association Test (IAT)	2
Focus Groups	2
Mixed	3

Table 4 – Research Methodologies

3.2.1 A comprehensive definition of Sustainable Food Packaging

The first research question of this systematic literature review concerns with providing a comprehensive definition of Sustainable Food Packaging. Therefore, the present section derives a consumers' definition of green packaging from the analysis of relevant literature.

Sustainable packaging – also known as environmentally-friendly packaging, eco-friendly packaging, green packaging or ecological packaging - must minimize its environmental impact (Steenis et al., 2017; Liem et al., 2022). According to the Sustainable Packaging Coalition (SPC, 2011) in order for a package to be considered ecological it needs to satisfy eight main criteria: (1) to be safe and healthy; (2) to satisfy market needs of performance and costs; (3) to optimize the use of recycled material; (4) to be sourced, manufactured, transported and recycled using renewable energy; (5) to be made using clean production technologies; (6) to be produced with healthy materials throughout the life-cycle; (7) to be designed for materials and energy optimization; (8) to be effectively recovered and used in industrial closed loop cycles. This definition has been widely accepted and mentioned by previous scholars (Magnier and Criè, 2015; Liem et al., 2022, Hermann et al., 2022) as it embraces a broad view of packaging throughout the life cycle, from production to disposal. Considering the many roles that packaging serves, from production to post-consumption, allows to understand the different

environmental attributes that would be otherwise unclear. Therefore, in our analysis we propose that the four main functions of packaging are: protection and preservation of food and beverages, handling facilitation from production to final consumption, communication and appeal for consumers' choice, and sustainability in the post-consumption phase of disposal or re-use (Lindh et al., 2016; Granato et al., 2022).

When it comes to consumers' standpoint, it is extremely hard to judge the environmental performance of a package, so that people often fail to assess packaging sustainability from a life cycle perspective (Liem et al., 2022; Granato et al., 2022; Otto et al., 2021; Boz et al., 2020; Steenis et al., 2017). In contrast with this view, Nguyen et al., (2020) proposed a consumers' definition of eco-friendly packaging, according to which consumers evaluate packaging based on materials, production technology and market appeal. However, this result came out from the qualitative analysis of 6 focus groups, involving a total of 36 consumers, which were allowed to discuss about the topic and reflect on attribute such as the manufacturing process which are usually underestimated by consumers during the evaluation phase (Lindh et al., 2016; Liem et al., 2022). Therefore, our definition draws on the work of Magnier & Crié (2015), according to which a sustainable package allows to deduct its beneficial characteristics explicitly or implicitly through its structural, graphical, or informative cues, which, in turn, consist of a detailed version of what Rettie and Brewer (2000) defined as visual and verbal components of package design. According to previous literature:

- *Structural cues* are materials, shape, size, weight, transparency, opening/closure mechanism, texture, reusability, over-packaging removal, which are all related to physical features of the pack itself (Magnier and Crié, 2015; Steenis et al., 2017; Herbes et al., 2020; Granato et al., 2022). Among the newest innovation, which still requires structural intervention of the package itself, literature is focusing a lot on the two smart packaging options: (1) intelligent packaging, that allows to monitor the product and inform consumers about its actual status (Cammarelle et al., 2021); (2) active packaging, that can actively change the environmental

conditions in packaged foods, to improve microbiological safety of products (Stoma and Dudziak, 2022).

- *Graphical cues* are colors, eco-labels, logos, icons, pictures, and any other graphics that evokes sustainable characteristics (Magnier and Crié, 2015; Steenis et al., 2017).
- *Verbal cues* are textual (or sometimes numerical information, e.g., eco-scores) information, such as environmental claims, which may be both self-declarations from manufacturers (e.g., “sustainable”, “eco-friendly”, “responsibly sourced”, “recyclable”), or additional claims explaining an environmental certification (e.g., for the Forest Stewardship Council Ecolabel “100% from well managed forests”) (Magnier and Crié, 2015; Steenis et al., 2017; Donato et al., 2021). Verbal claims may be referred to the package (e.g., “made with recycled materials”), to the product (e.g., “locally sourced”, “organic”) or even to sustainable values supported by the brand (e.g., signals of social responsibility, Rees et al., 2019).

Finally, we propose to add an additional element to which we may refer to as “*technology-enabled cues*” which lies at the intersection between graphical and informative cues. In that sense, an example can be the massive presence on food and beverage packages of QR codes, smart tools that can be scanned through the smartphone camera to easily reach a desired content (e.g., website) which provides consumers with additional information about social and environmental sustainability with the objective of driving their choice or boosting brand loyalty (e.g., Li & Messer, 2019; Rotsios et al., 2022).

Based on what has been discussed so far, consumers’ and producers’ perspectives should be integrated in a single framework in order to develop a complete understanding of what Sustainable Food Packaging really is. Therefore, we suggest looking simultaneously at the packaging life cycle and at the relative functions, perceived benefits, and cues (Table 5). For each stage, table 5 summarizes the packaging cue category (i.e. structural, graphical or verbal), and its relevant pro-environmental attributes.

STAGE IN PACKAGING LIFE	PACKAGING FUNCTION OR BENEFIT	PACKAGING CUE	CLASSIFICATION	PRO-ENVIRONMENTAL ATTRIBUTE
Production	Sustainability	n.d.	Manufacturing technology	Not harmful for the environment Innovative production technologies
	Protection and preservation	Structural	Material and dimension	Recycled Bio-based Paper-based Non-toxic Less over-packaging
	Communication	Graphical	Logos, eco-labels	e.g. Recycled logo; Bio Logo
	Communication	Verbal	Claims	e.g., “made of 100% recycled materials”
Transport and storage	Protection and preservation	Structural	Material and dimension	Lightweight Space-saving
Use	Protection Handling facilitation Avoid food waste	Structural	Material, size, texture, opening/closure mechanism	Resealable Easy to open Easy to empty Smart/Intelligent/ Active packaging
Post-Use	Sustainability	Structural	Materials and circularity	Reusable Recyclable Easily decomposed Biodegradable
	Communication	Graphical	Logos/labels	e.g. recyclable logo
	Communication	Verbal	Claims	e.g., info about how to differentiate waste
General	Communication	Technology-enabled and Verbal	QR Codes	e.g., “discover more about our sustainable efforts”

Table 5 – Sustainable Food Packaging Taxonomy (authors elaboration)

As it is easy to see from the table, some graphical and verbal cues are extremely useful to inform consumers about structural package characteristics (as for example material circularity) that would be otherwise impossible to assess. According to Magnier & Crié (2015) environmental cues on packaging can draw on its intrinsic attributes (e.g., materials, recyclability, biodegradability, overpackaging reduction) or its extrinsic attributes (e.g., eco-labels certifying the use of sustainable materials such as the FSC logo, circularity logos and claims). Indeed, either structural, graphical or verbal signals are used as tools to make inferences about food and packaging before the actual time

of purchase and consumption, in terms of functionalities, costs, and even food characteristics (Magnier and Crié, 2015; Steenis et al., 2017; Steenis et al., 2018; Granato et al., 2022). However, it is not clear whether there exist recurrent drivers of positive or negative consumers' responses in terms of both behaviors and evaluations.

3.2.2 Positive (vs. negative) evaluations of sustainable food packaging

Our second research question concerns with the identification of recurrent drivers of positive (vs. negative) consumers' responses when they are exposed to sustainable food packaging choices. To that purpose, the present section will present the details of the qualitative synthesis of selected papers, which were carefully examined and classified based on the type of packaging cue examined (e.g., structural, graphical, verbal, technology-enable), the product (e.g., food vs. beverage), the dependent variable (e.g., willingness to pay, perceived food quality, consumer's preference) and whether the findings documented a positive, negative, or mixed evaluation.

Before going through the details of the analysis, it is worth to mention that there exists two main approaches to packaging studies: (1) the **holistic approach**, which considers the influence of packaging as a whole, and (2) the **analytical approach**, which decompose the effects of single features (i.e., structural, verbal or graphical cues) on consumers' responses (Magnier and Crié, 2015; Steenis et al., 2017). Accordingly, selected papers were classified, finding that only N=7 works adopted the holistic approach generally referring to “environmentally friendly” packaging, while N=48 papers examined specific features of packaging design. This specific distinction among theoretical approaches allowed to identify a first recurring pattern of positive reactions to sustainable packaging, as the general output of papers adopting the holistic approach is positive.

Indeed, when authors do not refer to a specific attribute of sustainable packaging, but rather on its whole effect on consumers' choices and behavior, differential responses are related to individual characteristics, such as environmental concern and awareness, environmental attitude and values (Van Birgelen et al., 2009; Barber, 2010; Koenig-Lewis et al., 2014; Prakash & Pathak, 2017; Núñez-

Cacho et al., 2020; De Canio et al., 2021; Fischbach et al., 2022; Zeng, 2022). For example, Barber (2010) discovered that individuals’ environmental attitude, values and behaviors are good predictors of consumers’ intention to pay more for wine in green packaging. Similarly, Koenig-Lewis et al., (2014) found that purchase intention is positively influenced by general environmental concern and emotional evaluation (either positive or negative), but not by rational evaluations of benefits. Prakash and Pathak (2017) show that purchase intention of green packaging is significantly influenced by personal norms, attitudes, environmental concern, and willingness to pay. Moreover, van Birgelen et al. (2009) report that sustainable behaviors, in terms of purchase and correct disposal of beverages’ eco-friendly depend strongly on environmental awareness and attitude. In general, purchase intention towards ecofriendly packaging is influenced by personal norms, attitudes, environmental concern and other demographic characteristics, as predicted by Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1988) and Theory of Planned Behavior (TPB) (Ajzen, 1991, Ajzen, 2011).

Authors	Year	Nation	RQ/Goals	Sample	Product type	IV	DV	Key Findings
Van Birgelen et al.	2009	Germany	Which factors relate to purchase decisions of beverages with environmentally friendly packaging by consumers?	176	Beverage in general	Environmental awareness; Environmental attitude; Subjective Norms; Perceived behavioral control	Purchase Intention; Disposal Decisions	Consumers express willingness to buy ecological beverage packages, only if the taste of the beverage and the price remain unchanged. However, when explicitly asked more than 2/3 of respondents said they are willing to pay a price premium for sustainable packaged beverages.
Barber N.	2010	USA	to explore the significance of personality variables in shaping customers' perceptions and intention to purchase.	313	Wine	Environmental Attitude, Environmental Behavior; Environmental Values	Willingness to pay	The results indicate that importance of being environmentally friendly, considering environmental issues when making a purchase, and collectivism were all very good predictors of consumers' intention to pay more for green wine packaging.

Lindh, H et al.	2016	Sweden	to explore consumer perceptions and knowledge of the environmental aspects of food packaging	155	Organic food	Consumers individual characteristics (e.g. eating habits)	Willingness to pay	86% of respondents were willing to pay more for environmentally sustainable packaging, while the amount varies. The willingness to pay, though, was found to be statistically significantly largest among organic consumers and lowest among the non-organic consumers. Consumers are aware of their shortcomings in judging the environmental status of food packaging, indicating a need for guidance; otherwise, consumer choices can unintentionally counteract environmentally sustainable intentions.
Prakash, G., & Pathak, P.	2017	India	to understand the determinants of eco-friendly packaging among young consumers in India	204	Food in general	Attitude; Environmental Concern, Personal Norms, Willingness to Pay	Purchase Intention	Purchase intention towards ecofriendly packaging is influenced by personal norms, attitude, environmental concern and willingness to pay.
Prakash, G et al.	2019	India	How are egoistic and altruistic values of customers associated with their attitudes and intentions to buy eco-friendly packaged products?	227	Food in general	Environmental concern (Altruistic value); Health concern (Egoistic value)	Purchase intention/ healthiness of product	Findings suggest both these values (altruistic and egoistic) lead to a positive impact on consumers' attitude towards eco-friendly packaged goods. This finding indicates that young Indians perceive green packaging as beneficial not only for the environment but also to generate health benefits for them.
Popovic, I et al.	2020	11 countries (worldwide)	Which factors predict consumer willingness to pay more for liquid foods sold in environmentally friendly packaging, such as milk and juice?	7028	Milk and Juice	Eco-life style; Ecoliteracy (Co-variate: education) ; Attitude toward price and affordability; Attitude toward the brand	Willingness to pay	73% of participants were willing to pay more for green packaging (varying amount). It was found that (a) a consumer's attitude toward environmentally friendly packaging and (b) a consumer's attitude toward the brand of milk/juice were significant predictors of the consumer's willingness to pay more for liquid food in environmentally friendly packaging. Two factors were found to be important predictors of a consumer's attitude toward environmentally friendly packaging: ecoliteracy and an ecofriendly lifestyle. Finally, consumers who sort waste and for whom affordability matters are less likely to pay more for liquid food in environmentally friendly packaging.
Santos, V et. Al	2021	Portugal	it explores the impact of individual characteristics on the purchase intention of organic food in sustainable packaging	311	Organic food	Perceived environmental knowledge and environmental concern	Purchase intention	Organic consumers purchasing decisions are associated with sustainable packaging practices in a supply chain. The paper highlights the role played by changing consumer values and ecological thinking in aligning sustainability concerns in both sides of the product-package interaction.

Table 6 – Qualitative synthesis of papers adopting the holistic approach

Table 7 summarizes the N=7 records adopting the holistic approach, reporting: authors, publication year (in chronological order), country, research objectives, sample size, product type, dependent and independent variables and a brief description of key findings. Research methodology as well as the valence of evaluation (i.e., positive vs. negative) were excluded from the table, since all the seven papers adopted a quantitative research methodology (i.e., questionnaire) and documented positive self-reported consumers' evaluations of sustainable food packaging in terms of purchase intention (Van Birgelen et al., 2009; Prakash & Pathak, 2017; Prakash et al., 2019; Santos et al., 2021) and willingness to pay a premium price (Barber, 2010; Lindh et al., 2016; Popovic et al., 2020).

Even though consumers' individual characteristics are extremely relevant as they shape individual reactions to various marketing stimuli, the contribution of the holistic approach to our understanding of drivers of positive vs. negative products' evaluations remains poor. Indeed, authors mainly refer to environment-related explanatory variables such as self-reported "environmental concern", "environmental knowledge", "environmental attitude", for which results are extremely intuitive: the more environmentally conscious a consumer is, the better his/her choices and evaluations of green packages.

When it comes to the analytical approach the vast majority of studies explored the impact of structural cues (N=22), followed by graphic design (N=9), verbal claims (N=3) and technology-enabled cues (N=1). Moreover, N=13 works explored the combined effects of different cues, manipulating packaging characteristics through experimental stimuli (e.g., Songa et al., 2019; Steenis et al., 2017). In general, these works confirm positive evaluations and choices of food and beverages in sustainable packaging, either in terms of willingness to pay (e.g., Liu et al., 2017; Wensing et al., 2020; Fishback et al., 2022; Klaiman et al., 2022; Lindh et al., 2016; Popovic et al., 2020) purchase intention (e.g., Magnier and Schoormans, 2015; Koenig-Lewis et al., 2022; D'astous & Labrecque, 2021; Cho & Baskin, 2018; De Canio et al., 2021; Granato et al., 2022; Agerwup et al., 2019) and halo effects on food perceived quality, safety, naturalness, taste and healthiness (e.g., Magnier et al., 2016; Donato et al. 2021; D'astous & Labrecque, 2021; Liem et al., 2022). Halo effects are extremely relevant for

the purpose of this literature review, since they explicitly reflect consumers' tendency to form positive overall evaluation of a product or to make inferences about missing or unknown attributes (e.g., food quality and taste) because of other external cues (e.g., any cue informing that the package is sustainable) (Donato et al., 2021).

At the same time, the analytical approach to packaging research is much more effective than the holistic approach in order to detect and classify drivers of negative consumers' reactions. Indeed, through the qualitative analysis of papers we identified three main drivers of negative responses, that can be classified as: (1) uncertainty and skepticisms about new packaging solutions; (2) perceived mismatch between informative claims and other package (or food) characteristics, as for example visual appearance of the package itself (e.g., Magnier and Schoormans, 2015) or food healthiness (e.g., Donato et al., 2021); (3) simultaneous use of different beneficial cues.

Uncertainty and skepticisms towards new packaging solutions. Ferrara et al. (2020) explored consumers' attitudes towards eco-friendlier wine packaging, comparing glass (conventional) with bag-in-box, aseptic carton and PET bottles. Consumers' reported skepticism towards the adoption of alternatives, although 62% of respondents referred that they would consider purchasing the ecological pack after being assured about the quality of wine. Indeed, the negative effect of alternative packaging design on wine perceived quality, was recently confirmed by Orwowski et al., (2022), who also showed that the presence of an eco-label on the package can even strengthen this negative effect. Similarly, Lignou and Oloyede (2021) asked few consumers to express their preference for conventional packaging for biscuits (i.e., plastic) and meat (i.e., polystyrene with a single-use plastic lid) with respect to a new paper-based packaging for these two products. Overall, participants expressed no main differences in terms of overall liking for biscuits' packaging, while they strongly preferred conventional packaging for meat because of both familiarity with the conventional design and preference for the transparent lid, which allows to better assess food quality (Lignou and Oloyede, 2021). Moreover, examining willingness to pay for grapes through a discrete choice experiment, Hermann et al., (2022) found that consumer express lower willingness to pay for bio-based plastic

compared to single-use plastic, recycled plastic, paper-based or unpackaged grapes. Analogously, Aldred Cheek and Wansink (2017) investigated consumers evaluations of food in edible packaging, showing that explicitly informing consumers that the package is comestible negatively influences the perceptions of healthiness, actual taste and intention to buy the food in it. A similar result was found by Hencion et al. (2019), exploring consumers' acceptance and willingness-to-eat of chicken when informed about the use nanotechnology in its packaging: in general, the decrease in acceptance and willingness to eat when nano-technology was introduced, could be offset by particular benefits, such as information about improved food safety or a lower price. Regardless of the sustainable solution proposed, all these results could be explained by the fact that uncertainty and risk associated with new and more sustainable packaging solutions can lead to the emergence of negative emotions, such as feeling of being “worried” and “nervous” (Koenig-Lewis et al., 2014) about the packaging ability to protect and preserve food quality (Ferrara et al., 2020) or its safety (Hencion et al., 2019). Based on results of available literature, it is also worth to highlight that this negative result seems to be stronger for fresh produce or liquid food (e.g., meat, fish or wine) compared to dry food, such as biscuits or snacks (Lignou and Oloyede, 2021). Consequently, potential benefit of new – and more sustainable - packaging solutions should be emphasized to avoid the drawbacks of uncertainty and perceived risk, that could lead to the choice of the not sustainable, conventional, alternative.

Mismatch between sustainable cues and other package (or product) characteristics. Magnier and Schoormans (2015) examined the interplay between structural cues (i.e. package material: recycled paper vs. red aluminium) verbal ecological claims (present vs. absent) and individual environmental concern in shaping purchase intention of mixed nuts, via perceptions of brand ethicality. The findings of their work indicate that the adoption of ecological claims on conventionally appearing packaging (i.e., red aluminium) decreases consumers' willingness to buy the product, especially when the respondents' expressed low level of environmental concern (Magnier and Schoormans, 2015). In line with these findings, Liem et al., (2022) discovered that consumers'

perceptions of product sustainability are reduced when verbal, graphical and structural cues (e.g., label, colours, packaging materials) are inconsistent.

The incongruence between claimed and perceived sustainability is also relevant when packages are confronted to their contents: indeed, discrepancies between claims and actual environmental performance make consumers feel deceived (Steenis et al., 2022). Specifically, the authors exposed consumers to various combinations of packaging and beverage sustainability through a 3 (package sustainability: high, medium, low) x 3 (beverage sustainability: high, medium, low) experimental design, proving that perceived deception from partially green combinations is higher when the package is sustainable, and the beverage is not, weakening attitude toward the product and purchase intention (Steenis et al., 2022). Cho and Baskin (2018) also found that the perceived fit between package sustainability (high vs. low) and food healthiness (healthy vs. unhealthy) positively affect purchase intentions, suggesting that consumers perceive healthiness and sustainability as two strictly interrelated attributes (Magnier and Schoormans, 2015). Similarly, Marozzo et al. (2020) found that the use of *au naturel* colors (e.g., shades of beige) on packaging increases perception of products authenticity, which in turn increases willingness to pay for healthy food (i.e., rice, carrots, extra dark chocolate), but not for unhealthy food (i.e., butter). This perspective is also confirmed by Donato et al. (2021): healthy food in sustainable packaging (i.e., made of paper vs. plastic) is perceived as better in terms of quality and even more satiating than the same food sold in conventional packaging. All these works confirm that consumers tend to implicitly associate package sustainability and food healthiness, which in turn influence other evaluations of the product (e.g., willingness to pay, Koenig-lewis et al., 2022). All these works confirm that consumers tend to implicitly associate package sustainability and food healthiness, which in turn affect other evaluations of the product either in terms of willingness to pay (Koenig-lewis et al., 2022) perceived satiation (Donato et al., 2021); perceived food quality (Magnier et al., 2016) and purchase intention (Cho and Baskin, 2018).

Consequently, it is possible to conclude that actual or perceived discrepancies between sustainable cues and other package or product characteristics decrease favorable consumers' responses, in terms of attitudes, evaluations and choices of food in sustainable packaging.

Simultaneous use of different information about beneficial cues. Even though healthiness and sustainability are often perceived as two sides of the same coin, which are expected to occur together (e.g., Magnier and Schoormans, 2015; Cho and Baskin, 2018) explicitly referring to both benefits could be detrimental for overall food evaluations and choice. Indeed, two studies explored the joint effect of eco-friendly and healthy signals on consumers' perceptions (Huang et al., 2021; De Bauw et al., 2021): results shows that exposing consumers to two different labels simultaneously attenuate the positive effect of the single label, leading to lower evaluations of food products. Specifically, Huang et al., (2021) found that the joint display of nutrition and low-carbon labels is counterproductive, reducing self-reported purchase intention, mainly because of the zero-sum bias for which a superior attribute (e.g., high nutritional quality) should come at the expense of other attributes (e.g., sustainability, taste, etc.). Analogously, De Bauw et al., (2021) conducted a choice experiment to understand the way people would select food when informed, through front-of-pack labels, about (1) ecological performance of packaging through an eco-score and (2) nutritional information of food through the adoption of nutri-scores. Participants made better choice in terms of nutritional quality, but not in terms of environmental impact of their basket selection (De Bauw et al., 2021). Similarly, when consumers tradeoff among different environmental and functional attributes (e.g., eco-scores, price, localness, organic origin, etc.), consumers tend to confer more importance to the best performing attribute, regardless of whether it allows to select the best option available in terms of environmental performance (De Bauw et al., 2022). In general, those works suggests that when combined with other beneficial attributes, sustainability cues become less important as confirmed by Capitello et al., (2021) who found that carbon reduction claims on wine bottles are the least preferred quality labels for italian customers.

4. Emerging topics in sustainable food packaging literature and future research questions

Our third research question concerns with the identification of emerging trends in sustainable food packaging literature. To that purpose, we checked the most recent publications in our dataset (from January 2020 to December 2022) and matched the results with the outputs of the cluster analysis (*section 3.1*). In addition, based on the above-described analysis, limitations of existing literature and potential avenues for future research are identified and proposed.

As already anticipated, our analysis confirms that environmentally friendly food packaging is gaining considerable attention among scholars and related publications are growing exponentially, as more than 55% of selected studies were published only in the last 3 years. Moreover, we also recognize a growing interest towards the analytical approach to food packaging, since only two of the most recent papers adopted the holistic approach (i.e., Popovic et al., 2020; Santos et al., 2021), while all the others tried to explore reactions to one or multiple sustainable packaging cues (Magnier and Crié, 2015). Almost all studies are developed with the aim of finding alternatives to conventional (non-sustainable) packaging, especially single-use plastic which is solidly considered the least sustainable alternative by consumers (e.g., De Marchi et al., 2020; Núñez-Cacho et al., 2020; Wensing et al., 2020; Donato et al., 2021; Testa et al., 2021; Fischbach et al., 2022; Galati et al., 2022; Granato et al., 2022; Hermann et al., 2022; Koenig-Lewis et al., 2022; Nuojua et al., 2022). As for potential solutions, three main research streams are gaining ground and therefore are expected to grow even faster, referring to consumers' acceptance and evaluations of: (1) material circularity, reusable, recycled and recyclable packaging (e.g., Núñez-Cacho et al., 2020; D'astous & Labrecque, 2021; Nuojua et al., 2022); (2) innovative solutions, such as smart packaging and its subfields of active and intelligent packaging (see Siddiqui et al., 2022 and Yan et al., 2022 for a review); (3) technology-enabled cues, such as QR Codes or intelligent chips on food packaging, which provides new opportunities to inform and educate consumers about packages and foods' characteristics (Rotsios et al., 2022, Capitello et al., 2021). Naturally, current literature still misses a clear understanding of consumers' awareness, knowledge, and reaction to the most innovative food

packaging solutions: it would be advisable to combine multiple approaches, either qualitative, such as in-depth interviews and focus groups, and quantitative, as experiments or questionnaire, in order to explore consumers' associations and consequent evaluations of food when sold in each of these packaging alternatives.

As the main goal of this systematic literature review was to understand the impact of sustainable packaging solutions on food evaluation and decision-making process, we acknowledge some weaknesses of available knowledge base.

One main limitation of existing literature concerns with the adoption of the holistic approach to food packaging, which considers the influence of packaging as a whole on consumers' evaluations (see *section 3.2.2* for details). Even though in real consumption scenarios it would be impossible to isolate specific characteristics of the pack, just referring to sustainable food packaging to investigate consumers' responses in terms of food evaluations and choices does not provide remarkable insight, especially if the paper applies a quantitative research methodology. Indeed, the main drivers of differential responses in those works are environment-related explanatory variables such as self-reported "environmental concern", "environmental knowledge", "environmental attitude" (e.g., Van Birgelen et al., 2009; Prakash and Pathak, 2017; Santos et al., 2021) for which results are intuitive: the more environmentally conscious a consumer reports to be, the better his/her choices and evaluations of food in green packages. Consequently, except for studies conducted in real consumption settings or works that adopt a qualitative research methodology, if researchers are willing to understand consumers' responses to sustainable food packaging the analytical approach should be prioritized.

Relatedly, the majority of studies adopted a quantitative research methodology, mostly relying on Structural Equation Modeling (e.g., De Canio et al., 2021) or discrete choice experiments which allows to investigate the way in which consumers tradeoff among different environmental and functional attributes of packages (e.g., De Marchi et al., 2020; Wensing et al., 2020; Granato et al., 2022; Hermann et al., 2022). However, despite the popularity of discrete choice experiments, this

method does not allow to isolate the effect of singular environmental attributes. Also, scholars have recently adopted new methodological approaches such as Implicit Association Test (IATs, Koenig-Lewis et al., 2022) or eye-tracking method or both (Song et al., 2019). In general, works adopting an experimental design were more effective in answering our key research question (e.g., Magnier and Schoormans, 2015). However, many papers focused on comparing sustainable packaging solutions with non-sustainable conventional alternatives in terms of willingness to pay or intention to buy the more sustainable offer. Thus, it is possible that the great majority of positive results in terms of higher willingness to pay or greater intention to purchase the eco-friendly packaged food, is driven by social desirability biases which are inherently part of self-reported behavioral variables (Galati et al., 2022). To the best of authors' knowledge, none of the studies explored consumers' behavior in real marketplace, but they rather used virtual reality simulations (e.g. van Herpen et al., 2016) as a concrete approximation of real choices. Future research efforts should focus on real consumption settings, either online or offline, or on dependent variables which mainly concerns about food quality evaluation and less on behavioral responses, thus being less subject to risk of intention-behavior gaps. In general, more theoretical effort is required to explain consumers choices of food in sustainable packaging. Popular theoretical frameworks such as Theory of Planned Behavior (Ajzen, 1991) or Random Utility Theory (McFadden, 1974) have received a lot of attention in the literature, however the resulting explanations may be limited and not enough sector-specific. In order to better understand reaction to various sustainable packaging configurations either theories on cue utilization and signaling (Stigler, 1961) or theories about cognitive processes (Dual-process theories, Petty and Cacioppo, 1984; Construal-level theory, Libermann and Trope, 1998), should be prioritized. To our knowledge only few studies adopted these approaches, thus there is space for additional and significant evidence on how consumers form their attitudes towards food when green attributes are signaled through packaging. For example, according to the theory of information economics food quality attributes can be classified as search, experience or credence attributes based on whether they can be assessed prior to purchase, after consumption, or never (Schrobbach et al., 2023). Future

research should focus on how consumers make inferences about experience (e.g., taste) and credence (e.g., overall quality) attributes.

Also, little is known about the comparison of different environmental benefits (e.g. signaling social sustainability or environmental packaging attributes), or alternative redesign strategies (e.g., Steenis et al., 2018). Future research should consider exploring how different cues affect perceptions of food quality and safety, as both intrinsic and extrinsic attributes serve as tools to make inference about products evaluation (Magnier and Cri e, 2015; Steenis et al., 2017). Indeed, there exist infinite possibilities of combinations between structural, verbal, graphical and technology-enabled cues that can configure a sustainable food package, which leave space for additional exploration of drivers of positive or negative consumers evaluations. We highlight that in our dataset, only few studies focused on verbal claims directly reported on food packaging (e.g., Aagerup et al., 2019). However, given that consumers are often uncertain about the functional and sustainable benefits and risk of new packaging solutions, future research should deepen knowledge about the use of verbal claims as a tool to provide additional explanation of graphical (e.g., labels) and structural (e.g., materials) sustainable cues. Similarly, as technology-enables cues - such as QR codes on food packaging - provide food producers with new opportunities to inform and educate consumers about various sustainable initiatives (Capitello et al., 2021), we would recommend exploring how the additional information, provided through these tools, could boost superior foods' evaluation. To date, literature on this specific topic is still at its primary stage and therefore it is mostly concerned about consumers' intention to use the QR code itself, rather than on its effects on food choice and linking (Rotsios et al., 2022).

Finally, we found that the inconsistency between claimed sustainability and package appearance, or food characteristics is a possible driver of negative evaluations of food, in terms of lower willingness to pay, purchase intention or perceived food quality (e.g., Magnier et al., 2016; Steenis et al., 2022). At the same time, jointly communicating different beneficial attributes, as for example packaging sustainability and food healthiness, decreases the positive effect of each beneficial cue (Huang et al.,

2021). Future research should explore ways to avoid skepticism and zero-sum biases (Huang et al., 2021) which in turns affect the overall assessment of product quality.

5. General discussion and conclusions

The present study adopted two complementary methodological approaches – namely, a systematic review and a bibliometric analysis - to deeply explore the literature about sustainable food packaging. The four clusters identified through the keywords co-occurrence map are consistent with the main literature streams, which also take into consideration a multi-disciplinary and multi-stakeholder approach to the field: (1) consumers' evaluation, (2) environmental assessment of packaging performance; (3) packaging design and governmental intervention on materials and circularity; (4) industrial packaging innovation. To the authors' knowledge, this is the first study that applies this methodology to sustainable food packaging, except for Vila-Lopez and Kuster-Boluda (2020) who focused on other bibliometric insights (e.g., co-citation analysis, bibliographic coupling, co-authorship, etc.) and Wang et al., (2021) who explored literature about packaging in general. The four clusters identified through the present research are consistent with what has been identified by similar analysis (e.g., Wang et al., 2021), indicating robustness of findings. However, one of the main contributions of this work is that it adds sector-specific insights for the food and beverage industry, along with the graphical representation of relationships among keywords and clusters. It is beyond the scope of this paper to provide an entire list of relevant subjects; rather, we aim to encourage academics to discover new possible connections, or the absence of such ties, on a variety of interesting issues. Indeed, although the four topics are clustered, there exist significant interrelations and bridges between them which requires further explanations, especially for the two smaller clusters (Cluster 3 – Packaging design on materials and circularity; Cluster 4 – Food industry technological innovation) which also reflect the new research trends identified through the literature review (e.g., Testa et al., 2021; Nuojuua et al., 2022; Siddiqui et al., 2022; Yan et al., 2022).

The systematic literature review allowed us to propose an integrated taxonomy of sustainable food packaging, which considers both previous research efforts (e.g., Magnier and Crié, 2015; Steenis et al., 2017; Lindh et al., 2016; Granato et al., 2020), and new research trends, matching all the stages of the packaging life with sustainable attributes, either intrinsic or extrinsic (Magnier and Crié, 2015). As this work examined the role of eco-friendly packaging for consumers' evaluation and choice of food and beverage, our main goal was to unveil drivers of positive and negative responses to various environmental cues, either structural, graphical, verbal or technology-enabled. We found that consumers usually report positive perceptions of environmentally-packaged food except for three recurring cases: (1) when they are uncertain of potential benefits and risks of the new package; (2) when they perceive a mismatch between extrinsic signals and intrinsic attributes (e.g., product-package or claim-package misalignment); (3) when different virtuous attributes (e.g., sustainability and healthiness) are communicated jointly. While marketing literature clearly recognized the potential positive effects of packaging sustainability on food choice in terms on willingness to pay and purchase intention, we argue that these results may be driven by social desirability biases (Galati et al., 2022), thus it would be worth to focus much more on inferences about product qualities (e.g., Magnier and Schoormans, 2016), which may ultimately drive the behavioral responses in real market places.

Moreover, the proposed systematization of the literature allows to recognize some practical implications for consumers, managers and policy makers.

First, food producers and retailers should design their packaging according to the four dimensions which directly influence the perception of a package's eco-friendliness: namely, structural, graphical, verbal and technology-enabled cues. In any case, they should be aware of providing information that are relevant and coherent, in order to avoid consumers' confusion and inability to assess environmental performances of packaging. However, we also recommend avoiding overcrowding of sustainable cues on food packages and to carefully evaluate which attribute to prioritize, as communicating multiple benefits at once may weaken positive consumers' evaluations. In sum,

managers must provide clear and unambiguous information to support informed consumption choices that are less detrimental for our environment.

As negative responses are also generated by low environmental concern and lack of knowledge about environmental issues (e.g., global amount of packaging or food waste) and potential solution (e.g., new packaging material, circular strategies, avoidance of excessive packaging, etc.), policy makers should promote educational campaigns, to simplify the technical aspects of innovative solutions as well as to clarify the meaning and impact of different environmental signals. For example, it could be useful to explicitly inform consumers about how active packaging can be useful to avoid food waste (Cammarelle et al., 2021) or the underlying differences between recycled and recyclable materials (Testa et al., 2021).

Finally, the sustainable food packaging taxonomy could serve as a basis for educational messages directed to consumers, to help them becoming more aware about attributes and functionalities of sustainable food packaging, in order to inform their evaluations, to ultimately make more conscious and virtuous decisions.

Definitively, the present work confirms that sustainable food packaging is a fertile and interdisciplinary research field, which is expected to steadily keep growing in the next years.

References

- Aagerup, U., Frank, A. S., & Hultqvist, E. (2019). The persuasive effects of emotional green packaging claims. *British food journal*.
- Afif, K., Rebolledo, C., & Roy, J. (2022). Drivers, barriers and performance outcomes of sustainable packaging: a systematic literature review. *British Food Journal*, 124(3), 915-935.
- Aldred Cheek, K., & Wansink, B. (2017). Making it part of the package: Edible packaging is more acceptable to young consumers when it is integrated with food. *Journal of food products marketing*, 23(6), 723-732.
- Alp-Erbay, E. (2022). Nanomaterials Utilized in Food Packaging: State-of-the-Art. *Food Engineering Reviews*, 1-26.
- Andersen, N. (2021). Mapping the expatriate literature: A bibliometric review of the field from 1998 to 2017 and identification of current research fronts. *The International Journal of Human Resource Management*, 32(22), 4687-4724.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & health*, 26(9), 1113-1127.
- Ajzen, I., & Fishbein, M. (1988). Theory of reasoned action-Theory of planned behavior. University of South Florida, 2007, 67-98.
- Barage, S., Lakkakula, J., Sharma, A., Roy, A., Alghamdi, S., Almeahmadi, M., ... & Abdulaziz, O. (2022). Nanomaterial in Food Packaging: A Comprehensive Review. *Journal of Nanomaterials*, 2022.
- Barber, N. (2010). "Green" wine packaging: targeting environmental consumers. *International Journal of Wine Business Research*, 22(4), 423-444.

Boesen, S., Bey, N., & Niero, M. (2019). Environmental sustainability of liquid food packaging: is there a gap between Danish consumers' perception and learnings from life cycle assessment?. *Journal of cleaner production*, 210, 1193-1206.

Boz, Z., Korhonen, V., & Koelsch Sand, C. (2020). Consumer considerations for the implementation of sustainable packaging: A review. *Sustainability*, 12(6), 2192.

Cammarelle, A., Viscecchia, R., & Bimbo, F. (2021). Intention to purchase active and intelligent packaging to reduce household food waste: Evidence from Italian Consumers. *Sustainability*, 13(8), 4486.

Campbell-Arvai, V., Arvai, J., & Kalof, L. (2014). Motivating sustainable food choices: The role of nudges, value orientation, and information provision. *Environment and Behavior*, 46(4), 453-475.

Capitello, R., Agnoli, L., Charters, S., & Begalli, D. (2021). Labelling environmental and terroir attributes: Young Italian consumers' wine preferences. *Journal of Cleaner production*, 304, 126991.

CARVALHO, J. S., OLIVEIRA, J. D. S. C., & SÃO JOSÉ, J. F. B. D. (2022). Consumers' knowledge, practices, and perceptions about conventional and sustainable food packaging. *Food Science and Technology*, 42.

Chen, C. C., Sujanto, R. Y., Tseng, M. L., Chiu, A. S., & Lim, M. K. (2021). How is the sustainable consumption intention model in food industry under preference uncertainties? The consumer willingness to pay on recycled packaging material. *Sustainability*, 13(21), 11578.

Chirilli, C., Molino, M., & Torri, L. (2022). Consumers' Awareness, Behavior and Expectations for Food Packaging Environmental Sustainability: Influence of Socio-Demographic Characteristics. *Foods*, 11(16), 2388.

Cho, Y. N., & Baskin, E. (2018). It's a match when green meets healthy in sustainability labeling. *Journal of Business Research*, 86, 119-129.

De Bauw, M., Franssens, S., & Vranken, L. (2022). Trading off environmental attributes in food consumption choices. *Food Policy*, 112, 102338.

De Bauw, M., Matthys, C., Poppe, V., Franssens, S., & Vranken, L. (2021). A combined Nutri-Score and 'Eco-Score' approach for more nutritious and more environmentally friendly food choices? Evidence from a consumer experiment in Belgium. *Food Quality and Preference*, 93, 104276.

De Canio, F., Martinelli, E., & Endrighi, E. (2021). Enhancing consumers' pro-environmental purchase intentions: the moderating role of environmental concern. *International Journal of Retail & Distribution Management*.

De Feo, G., Ferrara, C., & Minichini, F. (2022). Comparison between the perceived and actual environmental sustainability of beverage packagings in glass, plastic, and aluminium. *Journal of Cleaner Production*, 333, 130158.

De Marchi, E., Pigliafreddo, S., Banterle, A., Parolini, M., & Cavaliere, A. (2020). Plastic packaging goes sustainable: An analysis of consumer preferences for plastic water bottles. *Environmental Science & Policy*, 114, 305-311.

Donato, C., Barone, A. M., & Romani, S. (2021). The satiating power of sustainability: the effect of package sustainability on perceived satiation of healthy food. *British Food Journal*.

Donato, C., D'Aniello, A. (2021). Tell me more and make me feel proud: the role of eco-labels and informational cues on consumers' food perceptions. *British Food Journal*.

Dörnyei, K. R., Bauer, A. S., Krauter, V., & Herbes, C. (2022). (Not) Communicating the Environmental Friendliness of Food Packaging to Consumers—An Attribute-and Cue-Based Concept and Its Application. *Foods*, 11(9), 1371.

Eck, N. J. V., & Waltman, L. (2014). Visualizing bibliometric networks. In *Measuring scholarly impact* (pp. 285-320). Springer, Cham.

Ertz, M., François, J., & Durif, F. (2017). How consumers react to environmental information: An experimental study. *Journal of International Consumer Marketing*, 29(3), 162-178.

Eurostat (2021) Packaging waste statistics. Available at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics

Fernqvist, F.; Olsson, A.; Spendrup, S. What's in it for me? Food packaging and consumer responses, a focus group study. *Br. Food J.* 2015, 117, 1122–1135. [Google Scholar] [CrossRef]

Ferrara, C., Zigarelli, V., & De Feo, G. (2020). Attitudes of a sample of consumers towards more sustainable wine packaging alternatives. *Journal of Cleaner Production*, 271, 122581.

Fischbach, E., Sparks, E., Hudson, K., Lio, S., & Englebretson, E. (2022). Consumer Concern and Willingness to Pay for Plastic Alternatives in Food Service. *Sustainability*, 14(10), 5992.

Galati, A., Alaimo, L. S., Ciaccio, T., Vrontis, D., & Fiore, M. (2022). Plastic or not plastic? That's the problem: Analysing the Italian students purchasing behavior of mineral water bottles made with eco-friendly packaging. *Resources, Conservation and Recycling*, 179, 106060.

Georgakoudis, E. D., Pechlivanidou, G. G., & Tipi, N. S. (2022). The packaging redesign issue—space exploitation and environmental benefits. *Management of Environmental Quality: An International Journal*, (ahead-of-print).

Granato, G., Fischer, A. R., & van Trijp, H. C. (2022). The price of sustainability: How consumers trade-off conventional packaging benefits against sustainability. *Journal of Cleaner Production*, 365, 132739.

Henchion, M., McCarthy, M., Dillon, E. J., Greehy, G., & McCarthy, S. N. (2019). Big issues for a small technology: Consumer trade-offs in acceptance of nanotechnology in food. *Innovative Food Science & Emerging Technologies*, 58, 102210.

Herbes, C., Beuthner, C., & Ramme, I. (2018). Consumer attitudes towards biobased packaging—A cross-cultural comparative study. *Journal of cleaner production*, 194, 203-218.

Hermann, C., Rhein, S., & Sträter, K. F. (2022). Consumers' sustainability-related perception of and willingness-to-pay for food packaging alternatives. *Resources, Conservation and Recycling*, 181, 106219.

Horská, E., Šedík, P., Mušínská, K., Savitskaya, T., Grinshpan, D., & Kačániová, M. (2021). Acceptability of Edible Food Packaging in Slovakia: A Case Study on Young Generation. *Frontiers in Sustainable Food Systems*, 5, 720700.

- Huang, B., Li, H., Huang, Z., Huang, J., & Sun, J. (2022). Chinese Consumers' Heterogeneous Preferences for the Front-of-Package Labeling on Fresh Pork: A Choice Experiment Approach. *Foods*, 11(18), 2929.
- Ketelsen, M., Janssen, M., & Hamm, U. (2020). Consumers' response to environmentally-friendly food packaging-A systematic review. *Journal of Cleaner Production*, 254, 120123.
- Klaiman, K., Ortega, D. L., & Garnache, C. (2016). Consumer preferences and demand for packaging material and recyclability. *Resources, Conservation and Recycling*, 115, 1-8.
- Koenig-Lewis, N., Grazzini, L., & Palmer, A. (2022). Cakes in plastic: A study of implicit associations of compostable bio-based versus plastic food packaging. *Resources, Conservation and Recycling*, 178, 105977.
- Koenig-Lewis, N., Palmer, A., Dermody, J., & Urbye, A. (2014). Consumers' evaluations of ecological packaging—Rational and emotional approaches. *Journal of environmental psychology*, 37, 94-105.
- Li, T., & Messer, K. D. (2019). To Scan Or Not To Scan: The Question Of Consumer Behavior And Qr Codes On Food Packages. *Journal Of Agricultural And Resource Economics*, 44(1835-2019-1549), 311-327.
- Liang, S., Qin, L., Zhang, M., Chu, Y., Teng, L., & He, L. (2022). Win Big with Small: The Influence of Organic Food Packaging Size on Purchase Intention. *Foods*, 11(16), 2494.
- Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of personality and social psychology*, 75(1), 5.
- Liem, D. G., in't Groen, A., & van Kleef, E. (2022). Dutch consumers' perception of sustainable packaging for milk products, a qualitative and quantitative study. *Food Quality and Preference*, 102, 104658.
- Lignou, S., & Oloyede, O. O. (2021). Consumer acceptability and sensory profile of sustainable paper-based packaging. *Foods*, 10(5), 990.

Lindh, H., Olsson, A., & Williams, H. (2016). Consumer perceptions of food packaging: contributing to or counteracting environmentally sustainable development?. *Packaging Technology and Science*, 29(1), 3-23.

Linnenluecke, M. K., Marrone, M., & Singh, A. K. (2020). Conducting systematic literature reviews and bibliometric analyses. *Australian Journal of Management*, 45(2), 175-194.

Lisboa, A., Vitorino, L., & Antunes, R. (2022). Gen Zers' intention to purchase products with sustainable packaging: An alternative perspective to the attitude-behaviour gap. *Journal of Marketing Management*, 38(9-10), 967-992

Liu, Q., Yan, Z., & Zhou, J. (2017). Consumer choices and motives for eco-labeled products in China: An empirical analysis based on the choice experiment. *Sustainability*, 9(3), 331.

Long, Y., Ceschin, F., Harrison, D., & Terzioğlu, N. (2022). Exploring and Addressing the User Acceptance Issues Embedded in the Adoption of Reusable Packaging Systems. *Sustainability*, 14(10), 6146.

Macena, M. W., Carvalho, R., Cruz-Lopes, L. P., & Guiné, R. P. (2022). Perceptions and knowledge regarding quality and safety of plastic materials used for food packaging. *Open Agriculture*, 7(1), 132-146.

Magnier, L., & Crié, D. (2015). Communicating packaging eco-friendliness: An exploration of consumers' perceptions of eco-designed packaging. *International Journal of Retail & Distribution Management*.

Magnier, L., & Schoormans, J. (2015). Consumer reactions to sustainable packaging: The interplay of visual appearance, verbal claim and environmental concern. *Journal of Environmental Psychology*, 44, 53-62.

Magnier, L., Schoormans, J., & Mugge, R. (2016). Judging a product by its cover: Packaging sustainability and perceptions of quality in food products. *Food quality and preference*, 53, 132-142.

Marozzo, V., Raimondo, M. A., Miceli, G. N., & Scopelliti, I. (2020). Effects of au naturel packaging colors on willingness to pay for healthy food. *Psychology & Marketing*, 37(7), 913-927.

McFadden, D. (1974). The measurement of urban travel demand. *Journal of public economics*, 3(4), 303-328.

Meng, Y., & Chan, E. Y. (2022). Traffic light signals and healthy food choice: Investigating gender differences. *Psychology & Marketing*, 39(2), 360-369.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G. and The PRISMA Group (2009), “Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement”, *PLoS Medicine*, Vol. 6 No. 7, e1000097.

Nguyen, A. T., Parker, L., Brennan, L., & Lockrey, S. (2020). A consumer definition of eco-friendly packaging. *Journal of Cleaner Production*, 252, 119792.

Notarnicola, B., Tassielli, G., Renzulli, P. A., Castellani, V., & Sala, S. (2017). Environmental impacts of food consumption in Europe. *Journal of cleaner production*, 140, 753-765.

Núñez-Cacho, P., Leyva-Díaz, J. C., Sánchez-Molina, J., & Van der Gun, R. (2020). Plastics and sustainable purchase decisions in a circular economy: The case of Dutch food industry. *PloS one*, 15(9), e0239949.

Nuojua, S., Pahl, S., & Thompson, R. (2022). Ocean connectedness and consumer responses to single-use packaging. *Journal of Environmental Psychology*, 81, 101814.

Oloyede, O. O., & Lignou, S. (2021). Sustainable paper-based packaging: A consumer’s perspective. *Foods*, 10(5), 1035.

Olsnats, C., Nilsson, B., & Pousette, S. (2015). Perceptions of Sustainability and Functional Aspects on Liquid Carton Board Packaging Materials versus Competing Materials for Juice Applications in Sweden. *Beverages*, 1(3), 194-203.

Orlowski, M., Lefebvre, S., & Back, R. M. (2022). Thinking outside the bottle: Effects of alternative wine packaging. *Journal of Retailing and Consumer Services*, 69, 103117.

Otto, S., Strenger, M., Maier-Nöth, A., & Schmid, M. (2021). Food packaging and sustainability—Consumer perception vs. correlated scientific facts: A review. *Journal of Cleaner Production*, 298, 126733.

Pereira, C. T. M., de Medeiros, A. C., Ventura, M. B., Pereira, D. M., & Bolini, H. M. A. (2022). Do the Colors of the Label and the Sweetening Agent Information Influence the Sensory Expectations Consumer? A Case Study with Skyr-Type Yogurt. *Foods*, 11(2), 167.

Cacioppo, J. T., & Petty, R. E. (1984). The elaboration likelihood model of persuasion. *ACR North American Advances*.

Popovic, I., Bossink, B. A., & van der Sijde, P. C. (2019). Factors influencing consumers' decision to purchase food in environmentally friendly packaging: what do we know and where do we go from here?. *Sustainability*, 11(24), 7197.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. *Journal of cleaner production*, 141, 385-393.

Prakash, G., Choudhary, S., Kumar, A., Garza-Reyes, J. A., Khan, S. A. R., & Panda, T. K. (2019). Do altruistic and egoistic values influence consumers' attitudes and purchase intentions towards eco-friendly packaged products? An empirical investigation. *Journal of Retailing and Consumer Services*, 50, 163-169.

Rees, W., Tremma, O., & Manning, L. (2019). Sustainability cues on packaging: The influence of recognition on purchasing behavior. *Journal of Cleaner Production*, 235, 841-853.

Rettie, R., & Brewer, C. (2000). The verbal and visual components of package design. *Journal of product & brand management*.

Rhein, S., & Schmid, M. (2020). Consumers' awareness of plastic packaging: More than just environmental concerns. *Resources, Conservation and Recycling*, 162, 105063.

Ritchie, H., & Roser, M. (2020). Environmental impacts of food production. *Our world in data*.

Rokka, J., & Uusitalo, L. (2008). Preference for green packaging in consumer product choices—do consumers care?. *International Journal of Consumer Studies*, 32(5), 516-525.

Rotsios, K., Konstantoglou, A., Folinis, D., Fotiadis, T., Hatzithomas, L., & Boutsouki, C. (2022). Evaluating The Use Of Qr Codes On Food Products. *Sustainability*, 14(8), 4437.

Santi, R., Garrone, P., Iannantuoni, M., & Del Curto, B. (2022). Sustainable Food Packaging: An Integrative Framework. *Sustainability*, 14(13), 8045.

Santos, V., Gomes, S., & Nogueira, M. (2021). Sustainable packaging: Does eating organic really make a difference on product-packaging interaction?. *Journal of Cleaner Production*, 304, 127066.

Schifferstein, H. N., Lemke, M., & de Boer, A. (2022). An exploratory study using graphic design to communicate consumer benefits on food packaging. *Food Quality and Preference*, 97, 104458.

Schrobback, P., Zhang, A., Loechel, B., Ricketts, K., & Ingham, A. (2023). Food Credence Attributes: A Conceptual Framework of Supply Chain Stakeholders, Their Motives, and Mechanisms to Address Information Asymmetry. *Foods*, 12(3), 538.

Shaikh, S., Yaqoob, M., & Aggarwal, P. (2021). An overview of biodegradable packaging in food industry. *Current Research in Food Science*, 4, 503-520.

Siddiqui, S. A., Zannou, O., Bahmid, N. A., Fidan, H., Alamous, A. F., Nagdalian, A. A., ... & Arsyad, M. (2022). Consumer behavior toward nanopackaging-a new trend in the food industry. *Future Foods*, 100191.

Silva, N., & Pålsson, H. (2022). Industrial packaging and its impact on sustainability and circular economy: A systematic literature review. *Journal of Cleaner Production*, 333, 130165.

Song, L., Lim, Y., Chang, P., Guo, Y., Zhang, M., Wang, X., ... & Cai, H. (2019). Ecolabel's role in informing sustainable consumption: A naturalistic decision making study using eye tracking glasses. *Journal of cleaner production*, 218, 685-695.

Songa, G., Slabbinck, H., Vermeir, I., & Russo, V. (2019). How do implicit/explicit attitudes and emotional reactions to sustainable logo relate? A neurophysiological study. *Food Quality and Preference*, 71, 485-496.

Steenis, N. D., van Herpen, E., van der Lans, I. A., & van Trijp, H. C. (2022). Partially green, wholly deceptive? How consumers respond to (in) consistently sustainable packaged products in the presence of sustainability claims. *Journal of Advertising*, 1-20.

Steenis, N. D., Van Herpen, E., Van Der Lans, I. A., Ligthart, T. N., & Van Trijp, H. C. (2017). Consumer response to packaging design: The role of packaging materials and graphics in sustainability perceptions and product evaluations. *Journal of Cleaner Production*, 162, 286-298.

Stigler, G. J. (1961). The economics of information. *Journal of political economy*, 69(3), 213-225.

Stoma, M., & Dudziak, A. (2022). Eastern Poland Consumer Awareness of Innovative Active and Intelligent Packaging in the Food Industry: Exploratory Studies. *Sustainability*, 14(20), 13691.

Sustainable Packaging Coalition (SPC). (2011). Definition of sustainable packaging. Available via. <https://sustainablepackaging.org/wp-content/uploads/2017/09/Definition-of-Sustainable-Packaging.pdf>.

Testa, F., Di Iorio, V., Cerri, J., & Pretner, G. (2021). Five shades of plastic in food: Which potentially circular packaging solutions are Italian consumers more sensitive to. *Resources, Conservation and Recycling*, 173, 105726.

Tranfield D, Denyer D, Smart P (2003) Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Br J Manag* 14(3):207–222

Van Birgelen, M., Semeijn, J., & Keicher, M. (2009). Packaging and proenvironmental consumption behavior: Investigating purchase and disposal decisions for beverages. *Environment and Behavior*, 41(1), 125-146.

Van Eck, N. J., Waltman, L., Dekker, R., & Van Den Berg, J. (2010). A comparison of two techniques for bibliometric mapping: Multidimensional scaling and VOS. *Journal of the American Society for Information Science and Technology*, 61(12), 2405-2416.

Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *scientometrics*, 84(2), 523-538.

Vila-Lopez, N., & Küster-Boluda, I. (2020). A bibliometric analysis on packaging research: Towards sustainable and healthy packages. *British Food Journal*.

Wang, R. L., Hsu, T. F., & Hu, C. Z. (2021). A Bibliometric Study of Research Topics and Sustainability of Packaging in the Greater China Region. *Sustainability*, 13(10), 5384.

Webster J, Watson RT (2002) Analyzing the past to prepare for the future: writing a literature review.

MIS

Wei, W., Kim, G., Miao, L., Behnke, C., & Almanza, B. (2018). Consumer inferences of corporate social responsibility (CSR) claims on packaged foods. *Journal of Business Research*, 83, 186-201.

Wensing, J., Caputo, V., Carraresi, L., & Bröring, S. (2020). The effects of green nudges on consumer valuation of bio-based plastic packaging. *Ecological Economics*, 178, 106783.

Wohlin, C., 2014. Guidelines for snowballing in systematic literature studies and a replication in software engineering. In: EASE '14: Proceedings of the 18th International Conference on Evaluation and Assessment in Software Engineering. <https://doi.org/10.1145/2601248.2601268>.

Yan, M. R., Hsieh, S., & Ricacho, N. (2022). Innovative food packaging, food quality and safety, and consumer perspectives. *Processes*, 10(4), 747.

Yun, B., Bisquert, P., Buche, P., Croitoru, M., Guillard, V., & Thomopoulos, R. (2018). Choice of environment-friendly food packagings through argumentation systems and preferences. *Ecological Informatics*, 48, 24-36.

Zeng, T. (2021). Impacts of consumers' perceived risks in eco-design packaging on food wastage behaviors. *British Food Journal*.

Annex A – Qualitative Synthesis of Selected Papers

Authors	Year	Goal/RQ	N	Classification	Product	IV	DV	Evaluation	Key Findings
Rokka, J., Uusitalo, L.	2008	the extent to which consumers value environmentally friendly labeled packaging in their product choices compared with other product characteristics.	330	Mixed: Structural (Material and circularity: recyclable carton vs non recyclable plastic; resealability) and graphical (label)	functional drink	info about the products varied in terms of packaging material, packaging resealability, brand and price.	Relative importance of attributes; Choice	Positive	One-third of consumers, favoured environmentally labelled packaging as the most important criteria in their choice. The environmental packaging was a strongly preferred product attribute when consumers choose among functional drink products (average relative importance being 34%), whereas the relative importance for price was 35%, 17% for resealability, and 15% for brand.
Van Birgelen, et al.	2009	(1) To what extent do consumers perceive environmental friendliness of packaging as important, compared to other product characteristics such as price, convenience, or functional attributes?; (2) Which factors relate to purchase decisions of beverages with environmentally friendly packaging by consumers?	176	Environmentally friendly packaging in general	Beverage in general	Environmental awareness; Environmental attitude; Subjective Norms; Perceived behavioral control	Purchase Intention; Disposal Decisions	Positive	Consumers seem to be willing to turn toward ecological beverage packages, as long as the taste of the beverage and the price remain largely unchanged. This result stands in contrast to the responses obtained from the open-ended question, indicating that more than two thirds of respondents would be willing to pay a price premium of at least €0.10 (\$0.13) for an environmentally packaged beverage.
Koenig-Lewis et al.	2014	exploring the role of rational and emotional approaches to evaluating ecological product claims.	S1: 6; S2: 312	Structural (organic material)	Water	Environmental concern	purchase intention	Positive	Environmental concern has a significant and positive effect on purchase intention. the effect of positive emotions on purchase intention is larger than that of negative emotions, thus suggesting that in the case of ecologically responsible packaging, negative and positive emotions have structurally different effects on intention to purchase.
Magnier L., Schoormans J.	2015	under what conditions consumers perceive and trust different ecological package design elements and how these elements influence purchase intention.	119	Mixed: Structural (conventional-looking: red aluminium vs eco-looking: recycled paper) and Verbal Claim	Mixed Nuts	Visual appearance (conventional vs eco), Verbal claim (present vs absent), Environmental concern	Purchase Intention	Mixed: Positive (when claim and appearance are coherent)	The ecological appearance positively influenced purchase intention. More importantly, the three-way interaction between the visual appearance, the verbal sustainability claim and EC was significant. Consumers with low environmental concern tend to reject packages with incongruent appearance and sustainability

									claim. Intention to purchase the conventional-looking package was significantly lower when a sustainability claim was present on the package than when no such claim was presented, while the presence of the sustainability claim did not significantly affect intention to purchase the ecological-looking package. Perception of brand ethicality explains purchase intention.
Lindh et al.	2016	to explore consumer perceptions and knowledge of the environmental aspects of food packaging	155	Environmentally friendly packaging in general	Organic food	n.a.	Willingness to pay	Positive	The results showed that a majority (86%) were willing to pay extra for environmentally sustainable packaging, while the amount varies. This also confirms the importance of packaging from an environmental perspective to consumers. The willingness to pay, though, was found to be statistically significantly largest among organic consumers and lowest among the non-organic consumers. When consumers' think about packaging sustainability, they indicate recyclability, reusability, low resource materials and using material from renewable sources. However, consumers are aware of their shortcomings in judging the environmental status of food packaging, indicating a need for guidance.
Magnier et al.	2016	how consumers react when sustainability is signalled via both the product and the package.		Structural (Material circularity)	Study 1: raisins and chocolate bars; Study 2: organic coffee vs. non-sustainable coffee	Packaging material (Plastic vs. paper)	Perceived Food Quality	Positive	Perceived quality of a food product is more positive when it is packed in a sustainable packaging than when it is packed in a conventional packaging. Next, we demonstrate that product sustainability moderates the influence of packaging sustainability. Finally, we show that the perceived naturalness of the product induced by package and product sustainability explains the perception of product quality.
van Herpen et al.	2016	whether offering fruit and vegetables without primary packaging increases the likelihood that consumers choose these products.	S1:100; S2: 125	Structural (Material: Unpackaged v,s plastic)	Fruit and vegetables (organic vs non-organic)	Plastic packaging vs. unpacked for organic vs. non-organic fruit and vegetables;	Number of organic choice made	Positive	Choice for organic fruit and vegetables increases when organics are offered without packaging. Unpacked fruit and vegetables are preferred over packed options overall, both for organic and non-organic products and a positive attitude towards organic does not moderate the effects.
Klaiman, et al.	2016	to assess consumer willingness to pay (WTP) for packaging materials and recyclability of a beverage product.	200	Structural: Material (Plastic, Glass, Carton, Aluminum) and Circularity (recyclability)	Beverage	Stimuli: Material (plastic vs. glass vs. paper vs. aluminum); Recyclability (yes vs no); price	Willingness to pay	Positive	Average estimated WTP for packaging recyclability is positive for all materials; however, it is the highest for plastic, followed by aluminum, glass, and then carton. One hypothesis is that consumers may be willing to pay the most for plastic packaging recyclability because they view plastic as more detrimental for the environment if it is not recycled. Average estimated WTP for glass and carton recyclability was the lowest.

Cavallo et al.	2017	to examine the effect of visual elements of packaging on the perception of healthiness of EVOO	214	Mixed: Structural (transparency ; production process); Graphical (eco-label)	Extra-virgin Olive Oil	color of the bottle (dark vs. transparent glass); cold processing logo (present vs. absent); organic logo (present vs. absent); sensory claim on the label (present vs. absent); COE (present vs. absent)	Healthiness	Mixed (bio-based and glass as most sustainable vs. plastic least sustainable)	Results suggested that the strongest effect on healthiness perception of EVOO seems to be given by the indication of Italian origin (the coefficient is +0.501). The darker glass bottle negatively affected the healthiness perception of EVOO (-0.643). But there were exceptions: it is positively evaluated by Italian respondents (+0.279) and by people who give importance to the origin of products (+0.335). Organic production influenced positively healthiness perception (+0.461). This effect was lower for people that have a high sustainable behavior (+0.336). A darker bottle: this hypothesis is partially accepted. In fact, it can be valid only for the Italian respondents, since Dutch respondents showed their preference for a transparent packaging;
Aldred Cheek, K., & Wansink, B.	2017	how people would perceive edible packaging and what barriers to adoptability it might face.	72	Structural (Edible packaging)	Frozen yogurt snack	Info about edible package (vs. no info)	Taste, Healthiness Intention to Purchase	Negative	Edible packaging comes in two general forms: integrated with or relatively separate from the food it encases. Framing a product as an edible package with environmental benefits can lead to negative judgment. Findings also suggest that consumers' judgments of edible packaging may depend on how well the packaging material is integrated with its principal food product, and that highly separated products (such as edible cups) may face greater barriers to adoption.
Steenis N.D., van Herpen E., van der Lans I.A., Ligthart T.N., van Trijp H.C.M.	2017	whether and how packaging sustainability influences consumer perceptions, inferences and attitudes towards packaged products.	249	Mixed: Structural (Material) and Graphic	Tomato soup	Packaging features (Structural, verbal, graphic)	Attitude towards packaged product	Neutral	The findings show that (packaging) sustainability is a highly salient association but is only moderately important for consumer attitudes. A comparison between consumer judgments and life-cycle assessment indicates that consumers rely on misleading, inaccurate lay beliefs to judge packaging sustainability and are therefore susceptible to making ineffective environmental decisions.
Ertz M., François J., Durif F.	2017	we investigate the combined effect of the presence of environmental labeling cues (third-party certified) and the amount of self-declared environmental claims	321	Mixed: Verbal Claim (Self-declared) and Graphical (Eco-label)	Cereal bars (Snack)	self-declared environmental claims quantity and environmental labeling - 2 (succinct vs. elaborated) × (absence of label cue vs. presence of label cue)	Product quality, propensity to purchase, perceived credibility	Positive	the perception of product quality is significantly higher when the self-declared environmental claims are complemented by an environmental labeling cue, but this is true ONLY when the info is elaborated (vs. succincted)

Orset et al.	2017	to study the consumers' perceptions through a willingness-to-pay (WTP) analysis.	148	Structural: Material and circularity (Biodegradable, biobased, recyclable)	Water	Plastic packaging: PET, r-PET, PLA and PEF.	Willingness to pay	Positive	Participants who attach a very high importance to the protection of environment give a higher premium for the use of r-PET instead using PET than the other participants and also attribute a higher premium to PLA. participants who are not confident to bottles producers' communication campaign, participants who do not know whether they are confident decrease the premium for using PEF (recyclable bioplastic) instead of using the other plastics.
Prakash, G., & Pathak, P.	2017	to understand the determinants of eco-friendly packaging among young consumers in India - a developing nation.	204	Environmentally friendly packaging in general	Food in general	Attitude; Environmental Concern, Personal Norms, Willingness to Pay	Purchase Intention	Positive	purchase intention towards ecofriendly packaging is significantly influenced by personal norms, attitude, environmental concern and willingness to pay.
Wei et al.	2018	to investigate the differential effects of three domains of CSR claims on consumers' (1) perceptions of food products, (2) attitudes toward company, (3) behavioral intentions, and (4) the potential moderating effects of food types on the tested relationships.	520	Structural (Material circularity)	essential: bread & milk; indulgent: cookies & ice cream	4 (CSR claims: none, food manufacturing, employee welfare, and eco-friendly packaging)	Healthiness, Taste, Attitude, Behavioral Intention	Mixed	significant main effect of CSR claims on consumers' perceived health benefits. The halo effect of employee-oriented employee welfare CSR claims was found to be salient in relation to consumers' taste perception of packaged food. eco-friendly packaging CSR claim resulted in the lowest willingness to pay premiums.
Cho, YN; Baskin, E	2018	to explore the impact of sustainability labels that quantify the overall environmental impacts of products on consumers' purchase intention of healthy vs unhealthy products	S1:53; S2:142; S3:189	Graphical (Labeling: sustainability performance score)	Cereal bars, vegetable pizza (healthy), canned sausage, apple pie (unhealthy); potato chips	Food type (Healthy vs. Unhealthy)	Purchase Intention	Positive	the fit between healthiness and sustainability (both high or both low) drives consumer buying preferences as well as product perceptions. However, a general skepticism in sustainability claims moderates this effect.
Boesen, S; Bey, N; Niero, M	2019	How do Danish consumers perceive the environmental sustainability of liquid food packaging? To what extent do Danish consumers know the meaning of eco-labels on packaging? How does the perception of Danish consumers with regard to the environmental sustainability of liquid food packaging compare with what can be concluded from quantitative assessments using LCA?	S1=197; S2=10	Structural (Material: Plastic vs. Paper Vs. Glass vs. Metal)	Soft drinks, Milk, Beer, Olive Oil, Tomato sauce	Info about the package	Perceived Sustainability	Mixed (biobased and glass as most sustainable vs. plastic least sustainable)	Recyclability, compostability and recycled contents are the most frequent features selected by Danish consumers to identify a sustainable package. However, only 9% of respondents said "it should consist of a single material" prerequisite for recyclability. consumers assess the environmental sustainability of the tested types of packaging primarily based on the material type and on what they can personally do at the disposal stage. Results are in contrast with LCAs.

<p>Song, L; Lim, YC; Chang, PI; Guo, YN; Zhang, MY; Wang, X; Yu, XY; Lehto, MR; Cai, H</p>	<p>2019</p>	<p>to investigate consumers' behavior and product information evaluation in the naturalistic environment.</p>	<p>156</p>	<p>Graphical: Ecolabels (different types either food-related or package-related)</p>	<p>Food in general</p>	<p>n.a.</p>	<p>Choice, attention toward the ecolabel (self-reported vs. spontaneous)</p>	<p>Mostly negative</p>	<p>Participants purchased 1544 products, out of which 110 (7%) had ecolabels on the package. Food-related ecolabels (Organic and NON GMO) were the two most frequently identified ecolabels on the purchased products; 2) a majority of the participants (54%) did not evaluate any product information at all for any of the items they purchased, while only 10% of the products purchased from all participants were evaluated, which indicates that most of the products were purchased through habitual shopping; 3) consumers' revealed preferences of ecolabeled products (through purchase actions) were lower than the stated preferences (through survey or hypothetical choice experiments); and 4) competing with other product information, ecolabels received little attention and awareness from consumers.</p>
<p>Henchion M., McCarthy M., Dillon E.J., Greehy G., McCarthy S.N.</p>	<p>2019</p>	<p>to explore consumer perceptions around two potential nano-inside and nano-outside food product applications</p>	<p>1046</p>	<p>Technology-enabled (nanotech)</p>	<p>Chicken fillet</p>	<p>Nanotechnology in packaging vs. nanotech in food</p>	<p>Utility scores, Overall acceptance of the product</p>	<p>Negative</p>	<p>In both applications (nano-inside and nano-outside), products produced using conventional technology were more acceptable than those produced using nanotechnology. Consumers' acceptance and willingness to eat decreased as nanotechnology was introduced and as the attributes were viewed as less beneficial. BUT different applications of a technology can result in varying levels of acceptance (higher acceptance for nanotechnology in packaging of chicken fillets rather than in the cheese product) and that offering salient benefits (e.g. health or lower price) can off-set technology concerns in some but not all instances.</p>
<p>Rees et al.</p>	<p>2019</p>	<p>RQ1: What is the level of consumer recognition of sustainability cues on packaging and what factors may influence this? RQ2: What is the insinuated influence of sustainability cues on insinuated purchasing intention (IPI)? RQ3: What is the influence of sustainability cues on insinuated purchasing behavior (IPB), are there CSC and if so which cues are of interest to them?</p>	<p>254</p>	<p>Graphical (Eco-labels)</p>	<p>Food in general</p>	<p>eco-label recognition</p>	<p>insinuated purchase intention; insinuated purchase behavior</p>	<p>Negative</p>	<p>Aside from the Fairtrade cue, where one in five reported positive insinuated purchase behavior, all other cues showed very low IPB despite high levels of recognition. The conversion of sustainability cue recognition to actual IPB was shown in this study to be cue specific and low 10% or less except the Fairtrade logo at 22%. Statistically significant differences within the sample population were observed for recognition by age, income and education and for IPB by income and education ($p < 0.05$) but again this was cue specific. Four distinct consumer clusters were identified with income being a differentiating factor for the cluster with high awareness and high IPI.</p>

Aagerup et al.	2019	to test whether green packaging claims are more persuasive than non-green claims, emotional green claims are more persuasive than rational green claims, and the hypothesized preference for products with emotional green packaging claims over rational green packaging claims is moderated by motivation, opportunity and ability.	S1=87; S2=245; S3=60	Verbal Claims (rational vs emotional vs control)	Organic Coffee	Type of verbal claim (rational vs emotional vs control)	Purchase propensity	Positive	Overall, consumers prefer products with green claims over those with neutral (control) claims, and products with emotional green claims to those with rational green claims. The studies also reveal that this effect is moderated by participants' environmental commitment, information processing ability and by distraction.
Prakash et al.	2019	How are egoistic and altruistic values of customers associated with their attitudes and intentions to buy eco-friendly packaged products?	227	Environmentally friendly packaging in general	food in general	Environmental concern (Altruistic value); Health concern (Egoistic value)	Purchase intention/ healthiness of product	Positive	findings suggest both these values (altruistic and egoistic) lead to a positive impact on consumers' attitude towards eco-friendly packaged goods. This finding indicates that young Indians perceive green packaging as beneficial not only for the environment but also to generate health benefits for them.
Songa et al.	2019	to understand the relation between consumers' attitudes and emotional reactions when exposed to recyclable materials (signaled through logos), assessing participants' prior explicit and implicit attitudes towards recyclability and their emotional reaction to food packages featuring logos of (non-)recyclability.	89	Mixed: Structural (material circularity) + graphical (recyclable logo and color)	Yogurt	presence of recyclable logo (vs. absence)	self-reported emotions, spontaneous emotional reactions	Positive	The emotional reaction was measured both at an explicit and at an implicit level, using direct (self-reported) and indirect (eye movement, facial expressions and pupil dilation) techniques respectively. Results showed that explicit attitudes predicted self-reported emotions, while implicit attitudes predicted the spontaneous emotional reactions, highlighting the importance to assess both explicit and implicit attitudes. Moreover, results showed that the relation between the time that people looked at the logo and the spontaneous emotional reaction was contingent upon the participant's implicit attitudes. Finally, a follow-up analysis revealed that people with positive implicit attitudes towards recyclability were faster in detecting the recyclable logo and spent more time on processing the logo which in turn resulted in better emotional reactions. Thus, the results suggest that implicit attitudes influence both visual attention and emotional reactions.

De Marchi et al.	2020	RQ1: How do consumers choose (i.e., trade off product attributes) across different bottled water products made with conventional plastic polymers (i.e., PET) or more sustainable materials? RQ2: Are consumers willing to pay more for sustainable plastic polymers compared to conventional petroleum-based plastics? And, if yes, are there differences depending on the specific material type? RQ3: Does sustainability-related information provision affect consumer preferences for such materials and the related WTP?"	N=212	Mixed: Structural: Material (plastic vs. PET vs. recycled PET vs. partially bio-based PET) and Grafic: color: green vs transparent	Water	Stimuli: Material (PLA PET vs r-PET vs bio-PET and graphic: green bottle vs transparent bottle; price.	consumer preference (choice) and Willingness to Pay	Mixed: positive for all types except for recycled plastic	i) despite receiving sustainability-related information or not, consumers prefer PLA water bottles with respect to common PET; ii) information provision affects the choice pattern for the alternative plastic polymers presented (i.e., increases respondents' likelihood to choose bio-PET alternatives and decreases probability of selecting r-PET with respect to PET), but its effect does not modify WTPs; iii) despite being more sustainable, r-PET is dispreferred by consumers when they are informed that it is partly made of recycled materials. As for bio-PET and r-PET, differences in preference with respect to PET are exhibited only in the Informed condition. In this regard, two main aspects must be discussed which relate to the role of information provision and to consumer negative preferences for recycled materials.
Marozzo, V., Raimondo, M. A., Miceli, G. N., & Scopelliti, I.	2020	the effects of au naturel colors featured in food packaging on consumer willingness to pay (WTP).	S1A=258; S1B=297; S2=98; S3=212; S4=204;	Graphical (Au naturel color)	Rice (Healthy), Carrots (Healthy), Butter (Unhealthy), Flour (Healthy), Extra Dark chocolate (Healthy)	Packaging colour (Au naturel vs non Au naturel)	willingness to pay	Mixed: positive for healthy food, negative for unhealthy.	The first two studies provided support to the proposed conceptualization of au naturel colors, and the next five experiments consistently showed that au naturel-colored packaging enhances consumer WTP for healthy food, also demonstrating that the effect of au naturel colors does not occur for food categories perceived as unhealthy.
Ferrara, C; Zigarelli, V; De Feo, G	2020	to explore the point of view of wine consumers in Italy regarding the substitution of glass bottles with other packaging alternatives for some types of wine in order to investigate their willingness to buy wine in these alternatives.	1000	Structural (Material: glass vs. bag-in-box, aseptic carton, and PET bottle)	Wine	Packaging material	Attitudes, willingness to purchase	Negative	The results show how most of the respondents (91%) are not willing to consider packaging alternatives for wine and want to buy only wine packaged in glass bottles mainly because they consider alternative packaging not suitable. Despite this, about 62% of them state that they would be willing to re-evaluate the purchase of wine in alternative packaging after being informed that, for most wines, the quality of the wine does not change in alternative packaging and that by using them the wine sustainability could improve.

<p>Núñez-Cacho P., Leyva-Díaz J.C., Sánchez-Molina J., van der Gun R.</p>	<p>2020</p>	<p>RQ1. Is a sustainable purchase decision influenced by a consumer's attitude or behavior toward sustainability? RQ2. Does a consumer's knowledge of the CE influence their purchase decision? RQ3. Do demographic aspects such as age influence the sustainable purchase decision?"</p>	<p>220</p>	<p>Structural (Material and circularity)</p>	<p>Food in general</p>	<p>(1) Level of knowledge about Circular economy (2) Level of knowledge about sustainability. (3) Environmental concerns.</p>	<p>Purchase Intention</p>	<p>Positive</p>	<p>sustainable purchase decision is conditioned by different consumer characteristics. Those consumers who follow sustainable behaviors in their ordinary lives, habits and customs will make sustainable purchase decisions in the food industry as well. the 82% of the sample participants knew the CE. Further, the results from the regression analysis allowed us to test the hypothesis that those consumers who have knowledge of the CE would opt for a sustainable purchase decision. Thus, we verified the theoretical arguments for the TPB and added a new explanatory factor for the sustainable purchase behavior of consumers related to the use of plastic packaging in the food industry. Moreover, younger buyers make more sustainable purchasing decisions in the food industry.</p>
<p>Popovic et al.</p>	<p>2020</p>	<p>Which factors predict consumer willingness to pay more for liquid foods sold in environmentally friendly packaging, such as milk and juice?</p>	<p>7028</p>	<p>Environmentally friendly packaging in general</p>	<p>Milk and Juice</p>	<p>Eco-life style; Ecoliteracy (Co-variate: education) ; Attitude toward price and affordability; Attitude toward the brand</p>	<p>Willingness to pay</p>	<p>Positive</p>	<p>27% of the participants were not willing to pay for liquid food in environmentally friendly packaging, 47% of the participants were willing to pay five cents more, 20% of the participants were willing to pay 20 cents more, and finally, 6% of the participants were willing to pay more than 50 cents more. it was found that (a) a consumer's attitude toward environmentally friendly packaging and (b) a consumer's attitude toward the brand of milk/juice were significant predictors of the consumer's willingness to pay more for liquid food in environmentally friendly packaging. In turn, the results show that a consumer's attitude toward price and affordability had a significant negative effect on his/her willingness to pay more for liquid food in environmentally friendly packaging. Two factors were found to be important predictors of a consumer's attitude toward environmentally friendly packaging: ecoliteracy and an ecofriendly lifestyle. Finally, the practice of sorting waste for recycling had a negative effect on the relationship between a consumer's attitude toward price and affordability and his/her willingness to pay more for liquid food in environmentally friendly packaging, which means that those consumers who sort waste and for whom affordability matters are less likely to pay more for liquid food in environmentally friendly packaging.</p>

<p>Wensing, J.; Caputo, V.; Carraresi, L.; Broring, S</p>	<p>2020</p>	<p>which green nudges are most effective to increase consumer WTP for biobased packaging. We tested a total of four strategies by providing consumers with nature pictures, reflection questions, information on bio-based plastics and normative information.</p>	<p>1019</p>	<p>Mixed: Structural, Graphical (Labels: bio-based plastic label; Label: recyclable vs. compostable)</p>	<p>vegetables (cherry tomatos)</p>	<p>Stimuli: Bio-based plastic label (present vs absent); Circular label (recyclable vs. compostable); Food-related label: organic (present vs. absent); Price.</p>	<p>Consumers preference and Willingness to Pay</p>	<p>Positive</p>	<p>Overall, results indicate that the share of positive preferences for bio-based packaging increases when consumers are exposed to green nudges. bio-based packaging is preferred by 71% of respondents in the CTRL treatment (info about discrete choice experiments) and by 75%, 83%, 87%, and 89% in the PICT (label info + nature picture + DCE), NORM (label info + normative info + DCE), REFL (Label info + video + reflection question + DCE), and INFO (Label info + Video + Text summary + DCE) treatments respectively. Overall, results indicate that the strongest effects are generated when the nudging strategy matches the characteristic of consumers' cognitive style. providing nature pictures only seems to increase WTP for bio-based packaging when consumers base their decision on their emotions and intuition. On the other hand, the strategies that provide environmental or normative information and activate the reflection about environmental consequences of plastics are most effective for consumers who enjoy cognitive deliberation.</p>
<p>Huang Y., Yang X., Li X., Chen Q.</p>	<p>2021</p>	<p>how the nutrition label and the carbon label jointly influence the preference of consumers. Therefore, the main objectives of this study are to analyze the different effects of the nutrition label and the low-carbon label on consumers' food preferences when they appear separately and in combination. Meanwhile, this study further explores the potential psychological mechanism of consumers and the applicable boundary of this effect.</p>	<p>136</p>	<p>Graphical: Label (low carbon)</p>	<p>ice cream, yogurt, steak, and toast.</p>	<p>nutrition and carbon labels (vs one label only)</p>	<p>purchase intention, wom, perceived value</p>	<p>Mixed (negative effect when two labels low carbon and health are shown together)</p>	<p>people have a positive preference for the nutrition label and the carbon label, respectively, while these two labels working simultaneously attenuate the positive effect of the single label. When facing nutrition and carbon labels simultaneously, people would infer partial resources are allocated to healthy and environmental aspects so they have a lower anticipated enjoyment from food consumption. Thus, these two labels working simultaneously attenuate the positive effect of the single label, and consumers have a lower evaluation of food products. In addition, the joint backfire on the effect is only exerted on people with a higher level of zero-sum bias and only when joint labels have a high consistency of labels. In Study 1, the backfire on the effect (Hypothesis 1) was first verified by constructing an ice cream purchase scenario, and the intermediary mechanism (Hypothesis 2) was verified at the same time. Results proved that the resource allocation and anticipated enjoyment served as serial mediators in the joint backfire.</p>

Lignou, S; Oloyede, OO	2021	(1) explore the sensory characteristics of the new paper-based packages developed during the study for two product categories (biscuits and meat) in comparison to the original packages, as assessed by a trained panel and (2) evaluate consumers' liking and perceptions of the said packages.	130	Structural (Material: paper-based)	Biscuit, Meat	Packaging material (original vs paper-based)	purchase intention	Mixed: negative (for meat), neutral for biscuits	For the biscuit packages, no significant differences were observed for the liking of any of the four dimensions (appearance, design, feel or overall liking); There was also a cluster of consumers (cluster 1—40.8%) that significantly liked the original package compared to the new packages. These were consumers who preferred to go with what they were familiar with and were less keen to try new propositions. Some of the consumers in this group had comments such as 'love the compact design', 'seems like the standard design so keen to buy', 'I am familiar with this packaging', 'it immediately reminds me of biscuits, which I like'. Regarding the meat packages, significant differences were observed for appearance, design, feel and overall liking with subsequent significant preference of certain packages over others (p < 0.0001). In general, consumers liked the original package (M0) more than the paper-based packages
Donato C., Barone A.M., Romani S.	2021	to explore the influence of package sustainability on food satiation perception.	S1=76; S2=178; S3=92	Structural (Material: paper vs plastic)	healthy and unhealthy food	Packaging material (Plastic vs. paper)	food satiation; food perceived quality	Mixed: positive for healthy food, negative for unhealthy.	Three experimental studies show that food quality is associated to higher perceived food satiation (preliminary study); that a food packaged in a sustainable package is perceived as more satiating than the same food packaged in a non-sustainable package and that this effect is explained by the higher perceived quality triggered by the presence of a sustainable package (Study 1); and that the positive relationship between higher perceived quality and perceived satiation is verified only for healthy but not for unhealthy foods (Study 2).
Capitello, R; Agnoli, L; Charters, S; Begalli, D	2021	1. to analyse the role of the carbon claim in driving consumer choice, measuring consumer willingness-to-pay (WTP) when the carbon claim is conveyed on a wine label, combined with other product attributes (O1); 2. to understand if heterogeneity in carbon claim evaluation, when presented with terroir and other cues, occurs and therefore their strength in pursuing product differentiation (O2).	982	Mixed: Graphical: Label (origin); and Verbal: Claim (Carbon reduction)	Wine	Stimuli: Quality labels (Carbon, PDO, Producers association) Label style (natural, sophisticated, minimal, contrasting); Brand; Additional info; Price	Choice, Willingness to pay	Mixed: positive origin, not that positive for carbon reduction	Results indicates that the carbon claim has a positive impact on the utility of three groups together comprising 46% of the sample and described as follows: those seeking original wines; price-sensitive and with low willingness-to-pay for both carbon and terroir claims; or highly interested in many different terroir expressions. The study suggests that wineries can use environmental attributes in conjunction with terroir ones following three different strategic patterns: to enhance the modernity of a wine; to connect the origin of a wine with production specificities shared among typical wine producers and; to echo product quality in the case of less reputed or cheap Protected Designation of Origin wines. the carbon reduction label was the least preferred quality label. The low importance of a carbon labels in influencing consumer choices is also pointed out by Mueller and Remaud

									(2013), who further highlight the scarce level of trust in this claim.
De Bauw et al.	2021	whether the Nutri-Score could be expanded to an 'Eco-Score' that would similarly encourage environmentally friendly food choices.	805	Graphical: Label (Eco-Score)	11 food products (meat, vegetables, pasta)	Two scores were displayed (vs. not) on each product tile: (1) the Nutri-Score, reflecting a product's nutritional quality and (2) an Eco-Score, reflecting a product's environmental impact.	nutritional values of food choices; environmental impact of food choices	Negative (providing 2 info increase healthiness of choice but not the environmental impact)	a joint Nutri-Score and Eco-Score label improves the Nutritional Quality of choices, but not the Environmental impact. However, the specific recommendation was the only treatment that also improved the EI. The improvements in NQI due to the scores could be explained by a reduced consumption of pork. The improvements in EI induced by the specific recommendation could mainly be explained by a reduction in beef consumption.
Cammar elle et al.	2021	to investigate the consumers' willingness to purchase active and intelligent packaging to reduce household food waste	260	Structural (Active and Intelligent packaging)			willingness to purchase	Positive	consumers are more willing to purchase intelligent packaging rather than active packaging to reduce their wastes generated at home, thanks to the ability of this package to provide real-time use-by or expiration data. are often concerned about the toxicity of active substances added to polymer films, as well as scared about the accidental ingestion of active sachets, or whether their content gets disintegrated in handling the product
D'astous A., Labrecq ue J.	2021	to explore the link between consumers' perceptions of packaging sustainability and naturalness and health inferences, as well as their impact on food purchase intention.	120	Structural: Circularity (reusable, recyclable, compostable)	dairy, cereals, meats, vegetables	Responsible packaging	intention to buy	Positive	the extent to which a food product package is seen as responsible (i.e., recyclable, reusable, compostable) has a positive and statistically significant impact on consumers' intention to buy it, and that it is through the sequential mediation of the product's perceived naturalness and healthiness that this relationship unfolds.

De Canio, F; Martinelli, E; Endrighi, E	2021	how environmental concern moderates the role played by external factors - preference towards sustainable retailers and trust in sustainable producers - in determining consumer purchase intentions for sustainable packaged foods.	278	Graphical: Eco-Label	food in general	Consumers involvement in eco-friendly label; Preference for sustainable retailers	Purchase Intention	Positive	The results evidence that consumer intentions to purchase sustainable packaged food products are directly driven by (1) concerns over the environment – resulted as the main contributor to consumers' pro-environmental intentions. (2) influence played by the retailer. Results confirm previous findings on the growing consumer attention on retailers' CSR policies towards reducing waste and adopting sustainable practices. (3) trust in sustainable producers has a positive impact on pro-environmental purchase intentions. Eco-labels, impacting on the image of sustainable producers, play a key role in enhancing purchase intentions for sustainable packaged food products, as stated by Testa et al. (2015) and Tanner and Kast (2003). As highlighted by Atkinson and Rosenthal (2014), the exclusive use of eco-labels is not sufficient to generate virtuous purchasing choices, if not expressly supported by producers' sustainable practices. Vice versa, food producers can reinforce the effect of their environment-friendly claims on consumer purchase intentions by using eco-labelling strategies for their food products.
Horská et al.	2021	H1: There exists statistically significant differences in the evaluation of different variants of edible packaging. H2: There exists statistically significant differences in the evaluation of different packaging attributes. H3: There exists statistically significant differences in the evaluation of packaging attributes between men and women. H4: There exists statistically significant differences in the evaluation of packaging attributes between urban and rural areas.	22	Structural (Edible packaging)	food in general	n.a.	Acceptability	Positive	consumers perceive as the most important aspect of food packaging the possibilities of their recycling, followed by the protective function and ecological aspect, while the least important aspect was the design of the packaging.

Oloyede, OO; Lignou, S	2021	(i) understand consumer perception of currently available food packaging; (ii) design sustainable paper-based packages for biscuit and meat products based on consumer opinions and expectations of sustainable paper-based packaging over a series of participatory focus group sessions; (iii) understand consumer opinions of the paper-based packages developed as well as evaluate and assess the characteristics and suitability of the packages.	60 total	Structural: Material (paper-based vs conventional) and transparency	Meat, Biscuit	Paper-based packaging alternatives	Opinions of proposed sustainable packaging	Positive	One of the main points highlighted for both the old and prototype biscuit and meat packages assessed in this study was the use of excessive packaging or over-packaging of the products which participants found off-putting. Though the prototype packages in this study were made from sustainable paper-based materials, participants felt the oversized nature of the packages was a form of wastage and was considered bad for the environment. Too much plastic packaging was mentioned as a major problem in today's food packaging, with participants discussing the negative impact of these plastics on the environment. On the other hand, participants found the paper-based prototypes as a more sustainable packaging solution to the plastic and polystyrene packages currently used for the biscuit and meat products assessed in the study.
Santos et al.	2021	1.Measure the impact of attitude, personal norms, perceived behavioral control, environmental concern, and perceived environmental knowledge on the purchase intention of organic food in sustainable packaging. 2.Measure the impact of environmental concern and perceived environmental knowledge on the attitude of organic consumers towards organic food in sustainable packaging.	311	Environmentally friendly packaging in general	Organic food	Perceived environmental knowledge and environmental concern	Purchase intention	Positive	organic consumers purchasing decisions are associated with sustainable packaging practices in a supply chain. it highlights the role played by changing consumer values and ecological thinking in aligning sustainability concerns in both sides of the product-package interaction.
Testa et al.	2021	measuring the role of environmental features of a potentially circular packaging (PCP) in purchase intention, and the what extent a third-party certification can be relevant in the final outcome.	1236	Mixed: Structural (Circularity and Material, plastic); Graphical (logos)	Juice	Recycled VS Compostable plastic; vs CONTROL (recyclable)	i) the attractiveness of the packaging; ii) the perceived material quality of the package; iii) the level of eco-friendliness of the packaging; and iv) their purchasing intention	Positive (No difference among conditions)	We found that despite the assumptions about sustainable plastic packaging consumption in the food sector, all of our options can be considered as valuable alternatives. Consumers may be confused and unable to establish the consequences in the circular economy in terms of each type of PCP. Regardless of whether third-party certifications are provided, consumers' purchasing intentions are mainly affected by the attractiveness, perceived quality, and eco-friendliness of the packaging. The consumers did not demonstrate a different purchasing intention for PCP with a third-party certification. H1: consumers are not fully accustomed to the CE, and thus cannot express different purchase intentions depending on the type of plastic (recyclable, recycled, and compostable) that constitutes the PCP.

Steenis et al.	2022	we investigate the extent to which using a general environmental claim for a packaged product that is only partially sustainable is perceived as deceptive by consumers (compared to packaged products that are wholly sustainable).	S1:609; S2=409	Verbal: Claim (puffery vs. subdued) + Sustainable product and package vs. only product vs. only pack	beverage	St1: Packaging sustainability (High, medium, low) vs Product sustainability (High medium low) S2: Actual sustainability (Product and packaging vs only package vs only product); claimed sustainability (puffery vs. subdued)	Attitude and purchase intention	Mixed (negative in case of high discrepancy between package and product sustainability)	when discrepancies between the firm's claimed sustainability and its actual sustainability arise, consumers feel deceived. Specifically, the higher the discrepancy, moving from fully discrepant to partially discrepant (i.e., partially sustainable), the higher the perceived deception. the perceived deception from partially sustainable product-packaging combinations is higher when only a peripheral attribute (packaging) is sustainable than when only a central attribute (contents) is sustainable. Mediation analyses furthermore show that effects of the claim–fact discrepancy on attitudes and purchase intentions are mediated through both perceived deception and perceived sustainability.
Herrman et al.	2022	"(1) Are consumers willing to pay more for plastic alternatives in comparison to ordinary plastic packaging and how do these WTP rates relate to each other? (2) Why are the reported WTP rates related to each other the way they are?"	254	Structural (Material: plastic, bioplastic, recycled plastic, paper, unpackaged)	n.a.	production (conventional vs organic); Origin (global vs regional) Pack (recycled, bio, paper, unpackaged); price.	willingness to pay	MIXED (positive for unpackaged , recycled plastic and paper; NEGATIVE for bioplastic)	There is a negative interaction effect for organic and regional products that points to a substitution relation between these attributes. Besides the negative interaction effect of organic food and packaging made from recycling plastic, we found positive (significant and non-significant) interaction effects, for example, regarding regional food and recycled plastic. In the case of bioplastic, the determined interaction effects (both are positive) are particularly interesting as this kind of packaging material itself does not lead to an increase in utility. higher wtp for organic and local foods. WTP higher for UNPACKAGED goods, The significant differences in preferences between plastic and recycled plastic, plastic and paper, as well as plastic and unpackaged products are also reflected in the respective WTP.

Orlowski et al.	2022	(1) how does a non-traditional wine package influence consumer purchase intention? (2) might the effect be different based on individual consumer traits? and (3) how can wine producers influence consumer purchase intention for wine sold in non-traditional packaging?	S1A=61 ; S1B=90; S2=97; S3=160; S4=335	Mixed: Structural (size, material, shape) + label (eco-label)	Wine	Packaging format	purchase intention	Negative	non-traditional packaging negatively influenced purchase intention of a complex product, wine, through product appeal and taste perceptions. We also demonstrate that the consumer response to non-traditional packaging is a function of individual differences (desire for unique products) and label attributes (eco-friendly labels). Study 4 investigates the moderating effect of eco-friendly labeling (presence vs. absence). the findings reveal that the negative effects of product appeal on expected taste for non-traditional packaging are enhanced when an eco-friendly label is included in the package design.
De Bauw, et al.	2022	to study preferences for (and trade-offs between) seasonality, localness, organic production and an aggregated Eco-Score. to test how differently primed sustainable self-views would affect these preferences.	300	Graphical: Label (Organic and Eco-Score)	Vegetables	Stimuli: attributes on seasonality, local vs. imported, organic vs. non organic, Eco-score; monthly price	Choice, Willingness to pay	Positive	Eco-scores were found equally important as price and localness, while organic was found least important. In addition, in situations of conflicting Eco-scores and origins (i.e. local with poor Eco-scores and vice versa), more importance was attached to the most beneficial attribute. For vegetable bundles with poor Eco-Scores, consumers had a stronger preference for local over imported, than for bundles with good Eco-Scores.
Fischbach E., Sparks E., Hudson K., Lio S., Englebreton E.	2022	to: (1) examine self-reported concern for the Gulf of Mexico's well-being and plastic pollution, (2) determine Environmental Identity, (3) examine willingness to pay for environmentally friendly food service products in restaurants, and (4) explore how demographics and environmental identity influence willingness to pay.	1371	Structural: Material (plastic vs more sustainable solution)	food in general	environmental concern; identity and demographics	willingness to pay	positive	We also correctly hypothesized that most respondents (over 96%) would be willing to pay for plastic alternatives in restaurants. However, the level they were willing to pay was not anticipated with over a third of respondents willing to pay 50 cents or more for plastic alternatives, and over a fifth of respondents were willing to pay 41 to 50 cents for plastic alternatives. Thereby, leading to a total of over 66% that would be willing to pay more than 40 cents per person per meal.
Galati A., Alaimo L.S., Ciaccio T., Vrontis D., Fiore M.	2022	to analyse the intention of young Italian students to buy bottles of water packaged with eco-friendly materials by demonstrating the presence of high sensitivity to pay for the purchase of green bottles.	378	Sustainable packaging in general (Structural: circularity, recyclability)	Water	green packaging	willingness to pay	Positive	consumers are willing to pay a premium price for a recyclable bottle, the answer is generally positive regardless of the cluster.
Granato, G; Fischer, ARH; van Trijp, HCM	2022	(1) How, in their packaged product choices, do consumers trade-off and compromise between packaging sustainability and other relevant benefits in the choice set, as convenience, preservation or aesthetic quality? (2) How do packaging design cues, benefits' perceptions	5035	Structural (material, format, opening/closure mechanism, transparency)	salad, baby food, biscuits	Structural packaging cues (material, format, opening/closure, transparency)	Purchase intention	positive	When consumers perceived the packaging as more sustainable, they also perceived it as superior on all the other benefits (the values of pairs 1, 2, 3, 5 and 6 are positive on all the benefits). The mere presence of a biodegradable/compostable material (with its logo) leads consumers to form positive perceptions on other packaging

		and consumers' characteristics relate and interact in affecting consumers' purchase intention for sustainable product-packaging alternatives?							benefits as well (e.g., convenience or attraction). Results suggest that when consumers must sacrifice a single benefit, a higher sustainability level tends to "absorb" the perceived drawbacks in terms of preservation, convenience, or attraction. However, when consumers must sacrifice two or three benefits, the drawbacks become more evident.
Koenig-Lewis N., Grazzini L., Palmer A.	2022	to explore consumers' automatic associations with compostable food packaging (vs. traditional plastic packaging), and to further examine if these differ between healthy and unhealthy food products	S1=93; S2=91; S3=105; S4=103	Mixed: Structural (Material: plastic vs compostable) and Verbal Claim	healthy and unhealthy sandwich	Material (compostable vs plastic)	Health association ; Purchase intention	Positive	the present research finds evidence for consumers' positive associations with compostable bio-based versus traditional plastic packaging. Studies 1 and 2 confirm that implicit associations with compostable (vs. plastic) food packaging did not significantly differ between 'healthy' and 'unhealthy' food products, while Study 3 shows that implicit and explicit attitudes towards compostable (vs. plastic) food packaging have a positive effect on consumers' purchase intentions.
Lisboa, A; Vitorino, L; Antunes, R	2022	It analyses young consumers' perceptions of eco-friendliness and ergonomics and their environmental attitude, and investigates their influence on purchase intentions.		Structural: shape	Milk	Packaging sustainability and ergonomics	Purchase Intention	Positive	consumers' perception of package sustainability positively influences environmental attitude. Environmental attitude positively influences environmentally friendly purchase intentions: when there is a dissonance between the perception and environmental attitude, it weakens the effect of environmental attitude on purchase intentions. when perception is in accordance with environmental attitude, it strengthens the effect of environmental attitude on purchase intentions.
Nuojua, S; Pahl, S; Thomps on, R	2022	responses to single-use packaging (SUP) varying in recyclability and material and asks whether the novel construct of ocean connectedness interacts with evaluations of the different types of packaging.	S1=60; S2=512	Structural: Material (plastic vs glass vs aluminium vs carton) Circularity (recyclable vs non-recyclable)	drink (water, juice, cola)	Pack attributes: Circular: recyclable vs not) and Material (plastic, vs glass vs aluminium vs carton)	Willingness to buy, anticipated positive affective reaction, anticipated guilt, attractiveness	Positive	Strong preference for recyclable over non-recyclable packaging and found interaction effects between recyclability and ocean connectedness: Larger differences between ratings for recyclable and non-recyclable packaging in consumers high in ocean connectedness than in respondents low in ocean connectedness. Interactions between packaging material and consumer ratings showed that plastic packaging in general was viewed as less benign by those high in ocean connectedness. in comparison to other material types, plastic packaging was viewed as a more viable option by those who showed lower connectivity with the ocean.
Donato C., D'Aniello A.	2022	whether the presence of food-related eco-labels positively affects food evaluations in term of perceived quality and perceived safety.	S1=472; S2=240	Graphical (Eco-labels)	frozen fish	Ecolabel type (package related FSC vs food-related MSC)+T8	food perceived quality and safety	Positive	When additional information about the meaning of eco-labels is provided, both food-related eco-labels (i.e. MSC) and packaging-related eco-labels (i.e. FSC) positively affect consumers' food evaluations in terms of perceived quality and perceived safety, via feelings of pride.

Liem
D.G., in
't Groen
A., van
Kleef E.

2022

to understand the influence of implicit milk packaging cues, on consumers' perception of the sustainability of the milk packaging.

S1=30;
S2=104

Mixed:
Structural
(Shape,
material,
texture) and
graphical
(color)

Milk

Texture
(Smooth vs
rough) x Color
(brown vs
white)

sustainabili
ty, taste,
health

Positive,
but NO
HALO effect

STUDY 1: seven themes were revealed determining consumer perceptions of package sustainability: nature of package material, expected visual harm to environment, possibility to re-use and recycle package, unnecessary packaging, appearance of packaging (colour and feel), congruence of packaging with content and consumer and company responsibility. Dutch consumers' view of sustainable milk packaging seems to be mainly, but not exclusively, focussed on post-usage, rather than taking into consideration the full life cycle of packaging. STUDY 2: Both the description of a rough texture and a brown cardboard colour of milk packages positively impacted consumers' perception of sustainability. The packaging cues did not result in a general positive halo effect, because the colour and described texture cues specifically increased the perception of sustainability of the packaging and not that of expected taste nor health.

Paper II - Is it recycled or recyclable? Improving consumers' perceptions of recycled plastic packages for food products.

Abstract

Sustainable strategies for food packaging often focus on circularity, proposing “recycled” or “recyclable” solutions. Even though different perceptions of these two alternatives have been overlooked by previous research, food products in recycled packages are negatively evaluated because of contamination inferences. The latter represents a main barrier to the adoption of recycled materials in FMCGs.

Building on the theory of time perspective and cognitive evaluation processes we develop a model to mitigate this negative effect. Across three experimental studies we investigate how packaging circularity (recycled vs. recyclable) may affect perceived food quality, showing that (a) recycled (vs. recyclable) plastic package negatively affect perceived food quality because of higher contamination perceptions; (b) when consumers are more present-focused, the negative effect of recycled packaging on food quality is mitigated; (c) the presence of a temporal appeal, which highlights that the sustainable activity has already been performed, mitigates negative quality perceptions, through the reduction of contamination inferences.

Our findings contribute to the theoretical understanding of consumer responses to circular claims on food packages providing some useful managerial insights to improve consumers' evaluation of food, in order to avoid contamination inferences when it is packaged in recycled plastic.

Keywords food package, food quality, recycled plastic; recyclable plastic

1. Introduction

Packaging industry is steadily working to introduce alternatives to conventional packaging, namely single-use item thrown right after reaching the customer or after product consumption (Petkoska et al, 2021). Even though novel food packaging techniques are gaining momentum (Russel, 2014; Petkoska, 2021), firms still heavily depend on plastic as it allows for multiple benefits, in terms of functionality (i.e. food protection and conservation along the supply chain), easiness of transportation and a good balance between costs and benefits (Koenig-Lewis et al., 2022; De Marchi et al., 2020). Usually, consumers report negative perceptions about the environmental performance of plastic (Lindh et al., 2016; Martinho et al., 2015, Fernqvist et al., 2015; Liem et al., 2022). However, while plastic leakage in the environment is a significant issue (De Marchi et al., 2020) plastic bashing and banning does not seem the right solution, as, especially in the food industry it can sometimes be the best option available for product conservation (De Marchi et al., 2020; Testa et al., 2021; Granato et al., 2022). For that reason, major interventions focus on circularity instead of complete replacement with alternative materials.

Consequently, one of the most used sustainable strategies for food package entails circularity, namely the respect of the core principles expressed by the 3R framework, according to which firms should *Reduce* the production inputs (in terms of virgin materials and energy consumption), favor *Reusability* of the package (once empty after product consumption), and finally ensure *Recyclability* of the material (Ghisellini et al., 2016; Geueke et al., 2018). The latter is often use as a circular strategy for food packages, as we are often exposed to packages made by recycled or recyclable materials (or both). The two circular strategies focus on different stages of the consumption process: recycled materials are the results of the conversion of waste into reusable ones by downgrading it into raw inputs and are employed in package production as substitutes to virgin materials, conversely recyclable packages prove their eco-friendliness in the post-consumption phase, at the moment of disposal. These materials usually are not already recycled but they can be collected and remanufactured into new products after they've been used. On the contrary, recycled materials already

entered the circular production loop, so they often are also recyclable (plasticrecycling.org). Those two principles are extremely relevant also because of the latest requirements of the European Packaging Directive (2018) according to which by 2030 all plastic packaging placed on markets within EU must be reusable or recyclable, and at least 55% of plastic packaging should be recycled. But how do consumers evaluate food products when they are packaged with recyclable or recycled plastic?

Beyond firms' efforts, the role that consumers might play as change agents becomes crucial: although they express concern towards environmental issues and tend to ask for effective and efficient sustainable actions by firms, convincing them to choose sustainably packaged food may still be a challenge. First, because they have limited knowledge of what sustainability means for food packaging and this may lead them to suboptimal choices (Otto et al., 2021; Ketelsen et al., 2020, Steenis et al., 2017). Second, and related to the first point, there might be a discrepancy between company view and consumer perception of what sustainable packaging is (Liem et al., 2022). Finally, sustainability is often balanced with multiple competing benefits or product characteristics, and it is not the only driver of consumption choices (Granato et al., 2022a, Steenis et al., 2017), so that it could even be ignored in some cases (Lindh et al., 2016). Indeed, a recent literature review on the topic of circular economy have shown that the lack of consumer acceptance of a circular business models is the main barrier to its diffusion (Camacho-Otero et. al, 2018).

To date, only few studies explored consumers' preference for recycled food packing (Orset et al., 2017; Hermann et al., 2022; Testa et al., 2021; De Marchi et al., 2020) leading to conflicting findings. For example, Hermann et al. (2022) and Orset et al. (2017) found that consumers are willing to pay more for food packaging made of recycled plastic compared to traditional plastic and bioplastic. De Marchi et al. (2020) found that bottles made of recycled plastic are disapproved by Italian consumers as they are perceived as contaminated. The latter is a key barrier to circular material flows (Baxter et al., 2017), which has also been confirmed by other studies (e.g., Magnier et al., 2019; Meng & Leary, 2021). Conversely, research focused on package recyclability mostly reported

positive effects on consumers perceptions, as purchase intention (e.g., D'astous & Labrecque, 2021; Nuojuua et al., 2022) willingness to pay (e.g., Galati et al., 2022) and affective reactions (e.g., Songa et al., 2019; Nuojuua et al., 2022).

To the best of authors' knowledge, except for Testa et al. (2021) which focused on consumers' inability to assess circular strategies depending on the type of plastic used (i.e., recycled vs. compostable vs. recyclable), no previous research has explicitly compared consumers reaction to food package made of recycled or recyclable plastic. Moreover, the effect that the two circular strategies may have on perceived food quality is quite overlooked by previous studies. However, this issue is quite relevant since packaging allows consumers to make inferences about product qualities and sustainable characteristics of packaging can predict a positive (or negative) halo effect on food evaluations (Magnier et al., 2016; Donato et al., 2021; Liem et al., 2022).

The present work aims to fill this gap by comparing the effects of these two circular strategies, namely the use of recycled or recyclable food packaging, on perceived food quality. We argue that as the two circular strategies are related to two different phases of the packaging life cycle – namely, at the beginning or at the end - they can influence perceptions of food quality in different ways. In addition to this, we highlight that the use of recycled materials implies that the specific sustainable action has already been performed by the company, while recyclability mainly requests consumers' action in the future, as packaging waste needs to be correctly disposed to enter the circular loop (De Marchi et al., 2020).

According to time perspective theory, people differ in the way they devote attention to the future (Nuttins, 1964; Lens, 1986; Nuttin, 2014). Therefore, individual's temporal orientation reflects the degree to which individuals think about the present and/or the future and the past (Shipp et al., 2009). As individual temporal orientation has been found to motivate behaviors as career progress and organizational citizenships (Strobel et al., 2013; Nuttin, 2014) and environmentally related behaviors (Urien and Kilbourne, 2011; Tangari and Smith, 2012) we also propose that it can impact

evaluations of sustainable food packages. Therefore, we propose this individual characteristic as a moderator of consumers' reaction to recycled and recyclable packaging.

Across three experimental studies, we find that recycled plastic has a negative effect on perceived food quality which is explained by contamination inferences and moderated by individual's temporal focus (Study 1). Accordingly, we propose a novel way to mitigate this negative effect of recycled plastic on perceived food quality, through the manipulation (Studies 2c and 2b) of individual's temporal focus.

This work makes different contributions to literature and practice. First, it contributes to the literature on sustainable packaging by being the first to compare the effectiveness of different circularity claims, that are now becoming ubiquitous on food packages. We fill this gap by analyzing how different circular strategies, signaled through claims, may lead to diverse consumers' evaluations of food products. In line with previous studies, we confirm that recycled plastic materials increase contamination perceptions, which in turn worsen products' quality perceptions, but we add a possible solution adopting the theoretical lens of temporal orientation (Shipp et al., 2009). We posit that while sustainability actions are usually construed and better processed when individual are more future-focused (Reczek et al., 2018) this may not be always the case for "recycled" items. Indeed, the activity has already been performed in the production process and consumers may fail to understand its eco-friendly characteristics, as they usually focus more on the post-consumption phase (Liem et al., 2022).

Finally, for what concerns implications for practitioners, this work offers clear suggestion to boost the efficacy of circularity for the packaging industry and food producers: managers should be aware of the possible detrimental effects of recycled plastic packaging, because people are worried about product contamination, hence its safety for health. Making consumers more conscious of the sustainable action that the firm has already performed, as well as providing additional information about the safety of the recycling process, may be an effective way to promote the adoption of recycled

plastic packages and possibly support the virtuous model of circular economy in the food packaging industry.

The remainder of this paper is organized as follows: first, in Section 2, we develop the conceptual background and present the research hypotheses. Section 3 is about the research methodology and the main results of the experimental studies. Then, Section 4 is about the general discussion of results and implications for theory and practice. Finally, limitations are acknowledged, and further research directions are presented.

2. Conceptual Background

2.1 Package circularity and food quality perceptions: the mediating role of contamination

Food packaging serves multiple functions in terms of transport, storage, handling and preservation of food items and it is crucial to prevent food deterioration and waste (Geueke et al., 2018; Schmid and Agulla, 2012; Otto et al., 2021; Granato et al., 2022a). Therefore, it plays a key role for food quality preservation as it guarantees food safety, it extends the shelf-life of products, and it also has the potential to reduce food waste (Guillard et al., 2018). However, it is at the center of the sustainability debate as it is responsible for huge amounts of waste (Liem et al., 2022).

Food manufacturers are developing alternatives to conventional packaging and the 3R principles of circular economy, namely “reduce, re-use and recycle”, are extremely relevant to minimize the environmental impact of the packaging industry (Geueke et al., 2018, Guillard et al., 2018). Firms should minimize raw material and energy inputs, as well as waste outcomes (Ghisellini et al., 2016; Geueke et al., 2018), while in the post-consumption phase repeated use or recyclability should be prioritized. Han et al. (2018) claim that in order for a pack to be truly sustainable it should adopt recycled materials, renewable resources and energy-efficient production processes at the beginning of its life cycle, while at the end it should be re-usable, recyclable or biodegradable. Currently, not all packages are re-usable, and biodegradable materials may still take a quite long time to decompose naturally. Therefore, there is a growing tendency to promote the adoption of recycled

or recyclable materials, signaled through equivalent circularity claims on packages, aimed at informing consumers about this sustainable attribute, that otherwise would be difficult to assess (Testa et al., 2021). Although the claims “recyclable” and “recycled” are often seen as two facets of the same coin, they are signaling two sustainable initiatives that differ from multiple perspectives. First, the two circular strategies focus on different stages of the consumption process: recycled materials are employed in package production as substitutes to virgin materials, whereas recyclable packages prove their eco-friendliness in the post-consumption phase, at the moment of disposal. So, the most important difference between the two circularity initiatives is that in the first case the sustainable action has already been performed by the package manufacturer, while for a recyclable package to be actually green it is important that the consumer himself engages in correctly sorting and disposing its waste. Moreover, packaging materials which are signaled to be recyclable, usually are not already recycled. On the contrary, recycled materials already entered the circular economy loop, so they often are also recyclable.

In general, recyclability is positively perceived by consumers, and it is an important driver of consumers’ choice (Rokka and Usitalo, 2008; Hoek et al., 2017; Lindh et al., 2016; Young et al., 2008; Arboretti et al., 2016). For example, Swedish consumers believe that recyclable materials have the least environmental impact (Lindh et al., 2016) and they are extremely important for LOHAS consumers (Martinho et al., 2015). Similarly, Klaiman, Ortega and Garnache (2016) assess that consumers are willing to pay more for recyclable materials of beverage products. All these results are in line with the work of Merlino et al. (2020) according to which package recyclability is seen as the most important feature of packaging.

Indeed, when it comes to recycled plastic packaging literature is often conflicting. Orset et al., (2017) explored consumers’ willingness to pay for different water packaging plastics demonstrating positive perceptions of recycled and biodegradable plastics. Grebitus et al. (2020) found that consumers preferred bottles made of recycled materials or bioplastic, only after searching information on the internet. A similar result was obtained by Hermann et al., (2022) that through a discrete choice

experiment and text analysis revealed that consumers are willing to pay more for food packaged in recycled plastic, compared to virgin material or bioplastic. On the opposite side, one study about Italian consumers shows that consumers prefer bioplastic water bottles over traditional one and that they also disapproved recycled plastic (De Marchi et al., 2022). Low quality perceptions may be also driven by lower performance in terms of package functionality (Zeng and Durif, 2019). Ruokamo et al., (2022) found that unclear labeling, uncertainty about the safety, poor availability and doubts about material durability are some of the main barriers to adoptions of recycled materials.

Surprisingly, to the authors' knowledge, no prior research has compared the two claims to determine how they may affect consumers' evaluations of food quality, but previous studies focused on either one or the other. Therefore, the first goal of the present research is to study through direct comparison the perception of recycled (vs. recyclable claims) in terms of perceived food quality.

We argue that consumers usually pay attention to material selection, especially when it comes in contact with food or their body (Ruokamo et al., 2022). Usually, when consumers perceive that the material used to make the package is of poor quality, they will transfer this negative quality perception to food (Underwood, Klien & Burke, 2001). It is widely recognized that consumers have negative opinions about the environmental performance of plastic (Lindh et al., 2016; Martinho et al., 2015, Fernqvist et al., 2015; Liem et al., 2022). Indeed, most of them associate plastic with negative perceptions and feelings as they consider it a low quality material (Fernqvist et al., 2015). These considerations are also influenced by the fact that public debates on environmental sustainability place considerable attention on plastic rather than other materials. However, it has been recognized that plastic provides functional benefits for which it is often irreplaceable (Otto et al., 2021). However, the use of recycled plastic to produce novel food packaging may be particularly challenging because of contamination risks and safety issues (Geueke et al., 2018). A recent study about Finnish consumers revealed that they are uncertain about the safety of recycled plastic (Ruokamo et al., 2022). Analogously, when choosing among recycled, bio-based or virgin plastic for water bottles, consumers reported higher perceptions of contamination in the case of recycled plastic (De Marchi et al., 2022).

The result is in line with previous research efforts, which highlighted a negative effect of contamination and disgust (Baxter et al., 2017; Meng and Leary, 2021) that is especially relevant in the context of food and beverages (Magnier et al., 2019). Therefore, we posit that negative perceptions of recycled plastic are mediated by perceptions of contamination, which lead us to hypothesis 1.

Formally:

H1: Recycled (vs. recyclable) plastic packaging will increase consumers' perceptions of food contamination, which will in turn decrease perception of food quality. Thus, contamination mediates the relationship between recycled plastic and perceived food quality.

2.2 The moderating role of temporal orientation

In order for sustainable attributes of packaging to effectively contribute to foods' evaluation and choice, they should be correctly perceived by recipients (Rees et al., 2019; Steenis et al., 2017). However, shortcomings in evaluation processes are at stake and package needs to adequately inform consumers, so that their choice could be in line with their ecological intention (Lindh et al., 2016; Steenis et al., 2017; Liem et al., 2022; Magnier and Schoormans, 2015).

It has been demonstrated that consumers seem to focus more on what happens to the package after product consumption, rather than on previous stages of its life cycle – i.e., from pre-purchase to actual consumption (e.g., eco-friendly production process; easiness of transportation, prevention of food waste, etc.) - (Lindh et al., 2016; Liem et al., 2022). Therefore, packaging is mainly seen as something that should be reusable or recyclable, or it would otherwise end up in oceans or landfills (Boz et al., 2020), and this often result in distorted assessments of its environmental impact (Steenis et al., 2017; Liem et al., 2022; Ruokamo et al., 2022) and preference for recyclable over recycled materials.

Therefore, we propose that another important moderator of whether recyclable versus recycled strategies would be more effective in shaping positive evaluations of food quality is individual's temporal orientation adopted to evaluate food packaging.

Indeed, temporal orientation reflects the individual predisposition to devote attention to the present, and/or the future and the past (Shipp et al., 2009): people can direct their minds either inward, focusing on the present, or outward, focusing on the past and the future (Maglio and Trope, 2019). It has already been proved that temporal orientation has the potential to motivate behavior such as career progress and organizational citizenships (Strobel et al., 2013; Nuttin, 2014) as well as to affect attitudes, perceptions, and subsequent behaviors (Strathman et al., 1994; Gleicher et al., 2014). Furthermore, future orientation affects ecologically friendly behaviors, since usually more future-oriented (vs. present-oriented) individuals are more likely to be sensitive to environmental issues and act accordingly (Urien and Kilbourne, 2011). In other words, when people are more concerned about the future, they would take actions in the present to affect the desired future outcomes (Ebreo and Vining, 2001). Also, based on predictions of construal level theory, Reczek et al. (2018) found that ecological choices are often seen as more distal, thus more compatible with a focus on the future (vs. the present) which in turn leads to higher purchase intention of sustainable products compared to non-sustainable alternatives.

Based on what has been discussed so far, we argue that one possible reason for which consumers' may prefer recyclable claims (over recycled) is because of its higher compatibility with a focus on the future, which is proper of consumers' perceptions of sustainable actions (Reczek et al., 2018). Similarly, people that are more future-oriented also reported higher recycling intentions (Ebreo and Vining, 2001). Conversely, when the material is already recycled and thus the signaled sustainable activity has already been performed during the production process, consumers may underestimate the environmental performance of package. We therefore make the following prediction:

H2: A consumer's temporal orientation will moderate the effect of sustainable circularity strategies on food contamination. More specifically, present-oriented (vs. future-oriented) individuals would express better product evaluations in terms of perceived contamination and subsequent food perceived quality, towards food packaged with recycled (vs. recyclable) plastic.

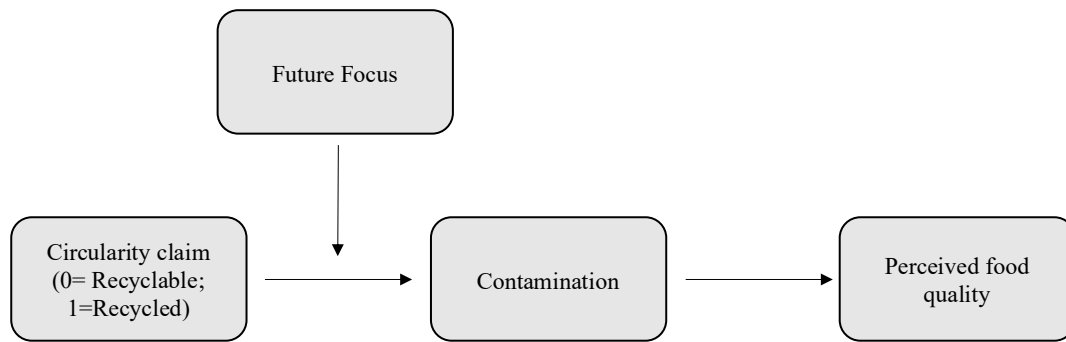


Figure 1 – Conceptual model

2.3 Overview of the current research

We tested our conceptual model across 3 experimental studies. First, we explored whether recycled vs. recyclable circular strategies could lead to different evaluations of food quality, via inferences about product contamination. Moreover, in study 1 we test whether the construct of individual temporal orientation (future-focused vs. present-focused) could act as a moderator of the relationship between circular claim (i.e., recyclable vs recycled) and food contamination. Based on the achieved results, Study 2a and 2b were aimed at providing a solution to mitigate the negative consumers' perceptions of food contained in recycled plastic, namely adding a temporal-oriented claim on food package to manipulate individual's focus. More specifically, study 2a tests whether the presence (vs. absence) of an additional claim, which clarifies that the sustainable activity has already been performed, reduces the negative effects of contamination perceptions. Furthermore, study 2b focuses on the content of such claim, through the comparison of present-focused and future-focused claims.

3. Research methodology

3.1 STUDY 1

3.1.1 Participants, design and procedure

The main goal of study 1 was to provide a comparison between recycled and recyclable plastic, also considering individual's future-focus (Reczek et al., 2018) expressed as a tendency to evaluate sustainability by focusing on the future or on the present. Therefore, the study was designed as a single-factorial between-subject experiment in which participants were either exposed to the

“recycled” or “recyclable” plastic condition, while the product, the brand name and all the other information remained constant.

110 UK consumers ($M_{age}=42,34$, $SD_{age}=13.6$; 27.8% male) were recruited through Prolific and received a small financial compensation in exchange of their participation for correctly completing to the study. Two participants did not complete the study, leaving 108 valid observations.

Respondents were instructed to evaluate a chocolate snack produced by a retailer who wanted to introduce the new product in an eco-friendlier guise, which differed across experimental conditions, being alternatively made of (1) recycled plastic or (2) recyclable plastic. The product and the brand were fictitious in order to avoid possible effects of brand recognition, familiarity, and preference (see Annex A, figure 1). After viewing experimental scenarios, participants were asked to evaluate food perceived quality ($\alpha= .93$, $M = 5.03$, $SD = 1.15$), food contamination ($\alpha= .91$, $M = 1.59$, $SD = .768$) and they were asked to self-report their future focus (1 item, bipolar, 7 point-Likert scale, adapted from Reczek et al., 2018) which measured the extent to which they evaluate sustainable packaging focusing on its future or on the present. To conclude the study, we administered a control question to check for participants chocolate snacks consumption, environmental concern and demographic variables. Recruited participants self-declared a very high environmental concern ($M_{envconc}=5.94$, $SD_{envconv}=.956$) on a 3-items 7-point Likert scale (Luchs et al., 2012, $\alpha =.89$).

3.1.2 Results

Manipulation checks revealed that the recycled (vs. recyclable) circularity claim was correctively perceived by respondents ($M_{recyclable} = 2.56$, $SD = 2.0$; $M_{recycled} = 5.79$, $SD = 1.84$; $F(1, 107) = 75.15$, $p < .001$). To test our hypothesis, we conducted a Moderated Mediation Analysis (PROCESS Model 7, Hayes 2017) in which we included circularity claim (0=recyclable, 1=recycled) as the independent variable, individual temporal orientation as the moderator and perceived food contamination, as the mediator. Moreover, gender and environmental concerns were included as covariates, since this data set was mainly made of female respondents (72.2%) which usually show a significantly higher

environmental concern, therefore they might affect hypothesized effects (Chirilli et al., 2022). Results showed a positive and significant direct effect of circularity claim on perceived contamination ($b = 1.06$, $se = .44$, $t = 2.37$, $p = .01$) confirming that recycled plastic is perceived as more contaminated than recyclable plastic. Neither gender ($b = .12$, $se = .16$, $t = .75$, $p = .45$) nor environmental concern ($b = -.03$, $se = .07$, $t = -.38$, $p = .70$) had an impact on contamination perceptions. In line with our conceptualization, there is a significant interaction between verbal claim (recyclable vs. recycled) and temporal focus ($b = -.19$, $se = .08$, $t = -2.2$, $p = .02$). Considering food perceived quality as dependent variable, the direct effect of circularity claim was positive but not significant ($b = .3616$, $se = .21$, $t = 1.6$, $p = .09$), contamination had a negative and significant effect ($b = -.40$, $se = .14$; $t = -2.8$; $p = .005$) whereas gender ($b = .13$, $se = .24$, $t = .56$; $p = .57$) and environmental concern ($b = .05$, $se = .11$, $t = .44$; $p = .65$) did not. In addition, in case of low levels of future focus (i.e. when respondent reported to focus more on the present than on the future when they evaluate sustainable food product), a significant indirect conditional effect of circular claim on food perceived quality equal to $-.1903$ [95% C.I., $-.4310$, $-.0073$] is confirmed. Conversely, when the circular claim is “recyclable” the indirect conditional effect is not significant [95% C.I. $-.14$, $.30$]. The index of moderated mediation is equal to $.0791$ [95% C.I., $.0014$, $.1811$]

3.2 STUDY 2a

3.2.1 Participants, design and procedure

The objective of study 2a is to further corroborate results of study 1, in order to check whether it was possible to influence participants' temporal orientation through the presence of an additional verbal appeal on the package. Moreover, we aim to propose a solution to overcome the actual limits of recycled plastic packaging (i.e. driving negative quality perceptions because of contamination issues), exploring whether adding an additional temporal appeal on food packaging may mitigate this negative effect. More specifically, in study 1 we found that people who express higher present-oriented cognition express better perceptions of food quality, when it is packaged in recycled plastic: in Study

2a the additional temporal appeal clarifies that the sustainable activity has already been done. We considered exclusively the recycled plastic packaging, as recyclable solutions require no need for intervention. A total of 105 UK participants ($M_{age}=39.18$, $SD_{age}=14.45$, $range_{age}=19$ to 75; 49.5% male) were recruited through Prolific Academics, in exchange of a small monetary compensation. The experiment had a 2 (temporal appeal: present vs. absent) x 1(recycled plastic packaging) between-subject design: across the two experimental conditions, participants were instructed to evaluate a new chocolate snack launched by a retailer, who wanted to test consumers' reaction to an eco-friendlier packaging (as in Study 1). Then, participants were either exposed to a baseline condition in which they saw the recycled plastic packaging (which the same as the one displayed in study 1) or a new packaging which also had an additional temporal appeal stating, "A delightful way to reduce plastic waste and to clean the world you live in: choosing already recycled materials!" (See Annex B). As for the other studies, the brand name (fictious) as well as the product description remained constant across stimuli. After viewing the food product, participants were asked to rate its quality ($\alpha= .93$, $M = 4.83$, $SD = 1.36$), perceived contamination ($\alpha= .88$, $M =1,5$, $SD = .873$) and the control variable of environmental concern ($\alpha =.89$, $M=5.12$, $SD=.934$). Finally, they were asked about gender and age.

3.2.2 Results

Manipulation checks revealed that the experimental manipulation (temporal oriented appeal present vs. absent) was correctively perceived ($M_{appeal} = 5.75$, $SD = 1.9$; $M_{absent} = 3.8$, $SD = 2.3$; $F(1, 100) = 88.48$, $p < .001$). Results from a Simple Mediation Analysis (PROCESS Model 4, Hayes 2017) confirmed again H1. The model tested used the manipulated temporal appeal (0=absent, 1=present) as the independent variable and perceived food contamination as the mediator. Environmental concern was checked as covariate. Gender distribution did not differ across experimental conditions, therefore it was not included as an additional covariate.

Results showed a negative and significant direct effect of the present-focused temporal appeal on perceived contamination ($b = -.44$, $se = .15$, $t = -2.8$, $p = .006$) confirming that when an additional message appeal that clarifies that the sustainable action has already been done and it actively contributes to the sustainability of our world today, negative perceptions of recycled plastics in terms of perceived food contamination are reduced. Moreover, the greater the self-reported environmental concern, the lower the perceived contamination ($b = -.21$, $se = .07$, $t = -3.0$, $p = .003$), thus suggesting that environmentally concerned people focus more on the sustainability of their choice as a driver of product quality, rather than as a possible driver of food contamination.

Considering food perceived quality as dependent variable, there was no significant direct effect of the present-focused appeal on product quality ($b = .28$, $se = .25$, $t = 1.13$, $p = .26$), while contamination had a negative and significant effect ($b = -.46$, $se = .15$; $t = -3.03$; $p = .003$). Finally, environmental concern ($b = .30$, $se = .11$, $t = 2.7$; $p = .007$) had a positive and significant effect on consumers' evaluation of food quality.

Results of study 2a provide further evidence of the effects of circularity claims on food evaluations, confirming that when the package is made of recycled plastic there exist a detrimental effect due to consumers' inferences about food contamination (H1). Second, consistent with our theorizing, adding an additional explanation of the sustainable action, in order to clarify that it has already been performed and how it actively contributes to the current wealth of our environment is proved to be a good way to reduce contamination perceptions, thus leading to better food evaluation.

3.3 STUDY 2b

3.3.1 Participants, design and procedure

To further support findings of study 2a, we conducted an additional study presenting different manipulation of the temporal focus (i.e. either future-oriented or present-oriented vs. absent/control). The experiment had a 3 (temporal appeal: present vs. future vs. absent) x 1 (recycled plastic packaging) between-subject design. We decided not to include a past-oriented appeal since it has

been found that present-focused temporal orientation lies against either future- and past-focused (Maglio and Trope, 2019).

A total of 180 UK consumers ($M_{\text{age}}=39.26$, $SD_{\text{age}}=10.92$, $\text{range}_{\text{age}}=19$ to 60; 33.3% male) were recruited through Prolific Academics, in exchange of a small monetary compensation. Regardless of the experimental conditions, participants were instructed to evaluate a new dried fruit snack launched by a fruit consortium, who wanted to test consumers' reaction to its eco-friendlier packaging. Then, participants were either exposed to a baseline condition in which they saw the recycled plastic packaging (which was very similar to the one displayed in study 1, except for the product category) or a new packaging which also had an additional temporal appeal stating either stating: "Think about your world today: choose recycled materials!" or "Think about your world tomorrow: choose recycled materials!" (See Annex C). As for the other studies, the brand name (fictious) as well as the product description remained constant across stimuli. After viewing the food product, participants were asked to rate its quality ($\alpha = .93$, $M = 4.80$, $SD = 1.54$), perceived contamination ($\alpha = .95$, $M = 1.67$, $SD = 1.05$) and the control variable of environmental concern ($\alpha = .91$, $M = 5.59$, $SD = .784$) which were the same as in the previous studies. Finally, we administered a control question to check for participants dried fruit snacks consumption and demographic variables.

3.3.2 Results

Manipulation checks revealed that the experimental manipulation (temporal appeal absent vs. future-focused vs. present-focused) was correctively perceived ($M_{\text{absent}} = 4.47$, $SD = 2.01$; $M_{\text{future}} = 5.6$, $SD = 1.4$; $M_{\text{present}} = 5.88$, $SD = 1.2$; $F(1, 180) = 88.48$, $p < .001$). Results from a Simple Mediation Analysis (PROCESS Model 4, Hayes 2017) confirmed our hypothesis. The model tested used the manipulated temporal appeal (0=absent, 1=future, 2=present) as the independent variable, perceived food quality as the dependent variable and perceived food contamination as the mediator. Environmental concern was included as covariate. Gender distribution did not differ across experimental conditions, therefore it was not included as an additional covariate.

Results showed a negative and significant direct effect of the temporal appeal on perceived contamination ($b = -.38$, $se = .08$, $t = -4.4$, $p < .001$) confirming that adding a temporal appeal reduces negative perceptions of recycled plastics in terms of perceived food contamination. Self-reported environmental concern did not affect the results ($b = -.11$, $se = .08$, $t = -1.2$, $p = .191$), and this result could be explained by the fact that all participants expressed high level of environmental concern.

Considering food perceived quality as dependent variable, there was no significant direct effect of the temporal appeal on product quality ($b = .207$, $se = .12$, $t = 1.61$, $p = .108$), while contamination had a negative and significant effect ($b = -.32$, $se = .08$; $t = -3.87$; $p = .0002$). Finally, environmental concern ($b = .06$, $se = .09$, $t = .68$; $p = .492$) was not significant. Therefore, the model confirms the presence of a full mediation of contamination inferences [95% C.I. .0563, .2852].

Results of study 2b provide further evidence of the effects of circularity claims on food evaluations, confirming that when the package is made of recycled plastic there exist a detrimental effect due to consumers' inferences about food contamination even if the snack is healthy (H1). Second, as expected, we found that both temporal oriented claims were effective in reducing contamination inferences. However, differently from previous studies (e.g., Reczek et al., 2018), we highlight that even present-oriented appeals can work when the sustainable activity is already providing beneficial effects in the present.

4. General Discussion and Conclusion

Across three experimental studies this work explores consumers perception of circularity claims on food packages providing three main outputs: first, we provide evidence about how the two most used circularity claims – i.e., recycled vs. recyclable – may shape differential consumers' evaluation of food quality. We observed a detrimental effect on food quality perceptions explained by food contamination inferences (Study 1). Subsequent studies were aimed at providing a possible solution to mitigate this negative perception of recycled plastic (study 2a and 2b). Through the measurement and manipulation of individual temporal orientation, we propose that recyclability

claims are more compatible with a future temporal focus, as the sustainable activity still must be performed, or in other words, the pack has to be recycled in the future by consumers. Analogously, recycled circularity claims may be less appealing to future-oriented individuals, but they should be more effective for those who focus more on the present. Therefore, we suggest that stimulating consumers to think about the present environmental benefits of recycled materials and making them aware of the fact that the sustainable activity has already been performed, may be a good way to boost products' evaluation in terms of food quality, reducing contamination inferences.

The present work is relevant from a theoretical and managerial perspective. It contributes to the literature on sustainable packaging and package design by being the first, to the authors' knowledge, to directly compare the effectiveness of different circularity strategies, signaled through "recyclable" and "recycled" claims, in terms of evaluations of food quality. We fill this gap through the analysis of how the two types of packaging circularity may lead to diverse consumers' evaluations of food.

In line with previous works (e.g., Magnier et al., 2016) we found that recycled plastic packaging are perceived as contaminated, thus being detrimental for food quality perceptions. In that sense, this study adds to the understanding of how consumers infer positive (vs. negative) attributes of food based on packaging design, confirming the strong effect of structural cues, such as product material and circularity on perceived food quality (Magnier et al., 2016; Donato et al., 2021; Donato & D'Aniello, 2022).

Moreover, we propose a novel possible reason to explain the negative perception of recycled plastic, advancing knowledge on how people usually elaborate information about sustainability. Following the work of Reczek et al., (2018), and drawing on theories about temporal cognition (Shipp et al., 2009) we propose that food quality perceptions are influenced by individual's future-orientation, which drives them towards preference for recyclable (over recycled) materials. Moreover, we provide evidence of a case in which a different temporal focus (i.e. present-oriented) could also be efficient to promote circularity – i.e. when it is clarified that the sustainable activity has already been performed. Therefore, we propose that temporal cognition is a useful variable to explore difference

in consumers' evaluation of alternative sustainable solutions (and not only when the greener option is compared with a conventional non-sustainable alternative).

For what concerns practical implications for managers and policymakers, this study provides specific recommendations to enhance the effectiveness of circularity initiatives, signaled through claims.

Managers should be aware of the possible detrimental effects of recycled plastic. The latter is not yet completely profitable as it drives negative perceptions of food quality, and this effect is driven by concerns about product's contamination, for which consumers may be disgusted by it or even be worried about its safety for health (Baxter et al., 2017; Meng and Leary, 2021, Magnier et al., 2019).

However, we found that making consumers more conscious of the sustainable action that the firm has already performed may reduce contamination perception. Accordingly, we suggest that communications about how using less virgin plastic is beneficial to our environment, as well as additional information about the safety of the recycling process, may be an effective way to promote the adoption of recycled plastic packaging for food.

Furthermore, we suggest that decisions about package design should consider the fact that the choice of materials implicitly communicate different degrees of intrinsic packaging sustainability: it is highly recommended to justify the congruence of circularity claims and packaging material, and eventually explain the multiple ways in which the package contributes to sustainability throughout its life cycle (e.g., avoiding food waste, being recyclable after consumption).

From a public policy perspective, it is essential to understand how to promote sustainable consumption and production, especially when it is related to circularity initiatives, which are at the center of many institutional efforts. Policy makers should support firms that engage in recycling processes and favor innovation initiatives that allows for innovative packaging solutions. Furthermore, to support consumers' understanding of sustainable initiatives and avoid mistakes, it would be useful to promote institutional advertising campaigns, at national or regional level, in order to increase consumers' awareness of the various beneficial effects of recycled material and, more specifically, of recycled plastic. Communications should avoid the general tendency of material

bashing; indeed, they should focus on a careful balance of pros and cons of any packaging alternative. This may be the more efficient strategy to promote a gradual shift towards a sustainable circular model.

4.2 Limitation and Direction for Future Research

Considering the need to properly address environmental issues and the urgency to raise consumers' acceptance of circular economy models, the relationship between package circularity and food quality perceptions is a fertile topic for future research and this work is intended to stimulate debate around this topic. However, we acknowledge some limitations that are briefly described below.

One of the most relevant limitations of the present study is that we focused on two specific circularity strategies, namely "recycled" and "recyclable", which were considered as mutually exclusive. However, firms often use multiple variations of verbal claims, which sometimes involve a combination of the two (e.g., "recycled and recyclable", "50% recycled, 100% recyclable"), or are consumers' calls to recycle (e.g., "recycle me! I'm 100% recyclable") or even try to push consumers to focus on its future recyclability of the pack even if it is also recycled (e.g., "recycle me again"). Future research should verify what are the effects of such textual alternatives in terms of consumers evaluation of food, as well as trust in sustainable initiatives, and perceived sustainability and greenwash.

Finally, and related to the previous point, this work focused on individual temporal orientation, but other interesting perspective could be considered. As for example, it would be interesting to explore the effects of social distance (i.e., self vs others) and the consequent level of personal agency that derives from such claims, which means exploring whether the sustainable action is made from others, namely the food producer, or has to be performed by the consumer. Investigating circumstances under which one or the other may perform better, as well as differences in emotional responses (e.g., feelings of gratitude vs. feelings of pride) may be an interesting topic for future research. Moreover, all these dimensions of distance (either temporal or social) could be used to create different stories

about the specific sustainable initiative. Future research could explore how storytelling about circularity claims may increase consumers' evaluation of food (Kamleitner et al., 2022). Scholars should consider verifying the differential effectiveness of present-oriented firm-focused and future-oriented consumer-focused storytelling when they are matched with recycled or recyclable circularity claims. Moreover, future work should also consider adopting different measures of temporal orientation, such as the Consideration of Future Consequence scale (CFC, Strathman et al., 1994) or the Zimbardo Time Perspective Inventory (ZTPI, Zimbardo & Boyd, 1999).

Our studies focus on a specific food category, namely snacks - either healthy (Study 2b) or unhealthy (Study 1 and 2a) -, mainly because those are popular products and they allowed to limit the risk that the results had to consider special dietary habits (eg., vegans, vegetarians, celiacs, etc). However, further studies should consider extending this analysis to different food categories, such as fresh produce, frozen or canned food, beverages, etc. Indeed, it could be useful to confront different food categories such as fresh produce and dry food, which have been found to drive differential responses to different packaging configurations (Lignou and Oloyede, 2021).

Moreover, the datasets always included UK respondents recruited through Prolific Academics. Even though the latter represents a valuable source of data, it would be advisable to perform the same analysis across different countries, including various cultures and eating habits, as additional insights on consumers' perceptions could be derived, improving the external validity of this findings.

For what concerns the research methodology, this work is based on 3 experimental studies performed in an online setting. Further research should consider performing discrete choice experiments, concretely making participants choose among food packaged with different materials and different degrees of sustainable characteristics (e.g., De Marchi et al., 2020). Moreover, it would be interesting to collect consumers' perceptions of recycled food packages through qualitative approaches such as in-depth interviews, focus groups, ZMET or observations of choices, which could let gain additional insights on the explanatory variables that affect evaluations of food, as well as any other barrier to the virtuous adoption of circular economy models.

Another limitation comes from the fact that our experimental stimuli did not differ in terms of visual appearance of packaging (Magnier and Schoormans, 2015). However, in real market scenarios, recycled materials are usually cloudier and opaquer than conventional plastics (Granato et al., 2022) and this may affect food quality perceptions. Future works should consider adding the effect of visual appearance of circular materials. Moreover, we would recommend exploring the interplay of additional packaging cues as for example the use of QR codes to add detailed explanation of production processes and package sustainability.

Institutional pressure, people concern, as well as limited availability of resources will continue to drive the transition towards more efficient circular economy models: through this work we aim to contribute to the exploration of consumers' reactions to recycled packages, which is a necessary step to optimize and accelerate this process of change.

References

- Baxter, W., Aurisicchio, M., & Childs, P. (2017). Contaminated Interaction: Another Barrier To Circular Material Flows. *Journal Of Industrial Ecology*, 21(3), 507-516.
- Bearden, W. O., Money, B. R., & Nevins, J. L. (2006). A measure of long-term orientation: Development and validation. *Journal of the Academy of Marketing Science*, 34, 456–467.
- Buehler, R., & Griffin, D. (2003). Planning, Personality, And Prediction: The Role Of Future Focus In Optimistic Time Predictions. *Organizational Behavior And Human Decision Processes*, 92(1-2), 80-90.
- Camacho-Otero, J., Boks, C., & Pettersen, I. N. (2018). Consumption In The Circular Economy: A Literature Review. *Sustainability*, 10(8), 2758.
- Chekima, B., Igau, A., Wafa, S. A. W. S. K., & Chekima, K. (2017). Narrowing the gap: Factors driving organic food consumption. *Journal of Cleaner Production*, 166, 1438-1447.
- Chirilli, C., Molino, M., & Torri, L. (2022). Consumers' Awareness, Behavior and Expectations for Food Packaging Environmental Sustainability: Influence of Socio-Demographic Characteristics. *Foods*, 11(16), 2388.
- D'astous, A., & Labrecque, J. (2021). The Impact Of Responsible Food Packaging Perceptions On Naturalness And Healthiness Inferences, And Consumer Buying Intentions. *Foods*, 10(10), 2366.
- De Marchi, E., Pigliafreddo, S., Banterle, A., Parolini, M., & Cavaliere, A. (2020). Plastic Packaging Goes Sustainable: An Analysis Of Consumer Preferences For Plastic Water Bottles. *Environmental Science & Policy*, 114, 305-311.
- Donato, C., Barone, A. M., & Romani, S. (2021). The Satiating Power Of Sustainability: The Effect Of Package Sustainability On Perceived Satiation Of Healthy Food. *British Food Journal*.
- Donato, C., & D'Aniello, A. (2022). Tell Me More And Make Me Feel Proud: The Role Of Eco-Labels And Informational Cues On Consumers' Food Perceptions. *British Food Journal*.
- Ebreo, A., & Vining, J. (2001). How similar are recycling and waste reduction? Future orientation and reasons for reducing waste as predictors of self-reported behavior. *Environment and Behavior*, 33(3), 424-448.
- European Union (2018) Packaging Directive. Directive (Eu) 2018/852 Of The European Parliament And Of The Council Of 30 May 2018 Amending Directive 94/62/Ec On

Packaging And Packaging Waste. Available At <https://eur-lex.europa.eu/legal-content/en/txt/?qid=1551965345008&uri=celex:32018l0852> Lastly Accessed On May 2022

- Fernqvist, F., Olsson, A., & Spendrup, S. (2015). What's In It For Me? Food Packaging And Consumer Responses, A Focus Group Study. *British Food Journal*.
- Galati, A., Alaimo, L. S., Ciaccio, T., Vrontis, D., & Fiore, M. (2022). Plastic Or Not Plastic? That's The Problem: Analysing The Italian Students Purchasing Behavior Of Mineral Water Bottles Made With Eco-Friendly Packaging. *Resources, Conservation And Recycling*, 179, 106060.
- Geueke, B., Groh, K., & Muncke, J. (2018). Food Packaging In The Circular Economy: Overview Of Chemical Safety Aspects For Commonly Used Materials. *Journal Of Cleaner Production*, 193, 491-505.
- Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A Review On Circular Economy: The Expected Transition To A Balanced Interplay Of Environmental And Economic Systems. *Journal Of Cleaner Production*, 114, 11-32.
- Gleicher, F., Boninger, D. S., Strathman, A., Armor, D., Hetts, J., & Ahn, M. (2014). With an eye toward the future: The impact of counterfactual thinking on affect, attitudes, and behavior. In *What might have been* (pp. 295-316). Psychology Press.
- Granato, G., Fischer, A. R., & Van Trijp, H. C. (2022a). The Price Of Sustainability: How Consumers Trade-Off Conventional Packaging Benefits Against Sustainability. *Journal Of Cleaner Production*, 132739.
- Granato, G., Fischer, A. R., & Van Trijp, H. C. (2022b). A Meaningful Reminder On Sustainability: When Explicit And Implicit Packaging Cues Meet. *Journal Of Environmental Psychology*, 79, 101724.
- Gu, B., Tang, X., Liu, L., Li, Y., Fujiwara, T., Sun, H., ... & Jia, R. (2021). The Recyclable Waste Recycling Potential Towards Zero Waste Cities-A Comparison Of Three Cities In China. *Journal Of Cleaner Production*, 295, 126358.
- Guillard, V., Gaucel, S., Fornaciari, C., Angellier-Coussy, H., Buche, P., & Gontard, N. (2018). The Next Generation Of Sustainable Food Packaging To Preserve Our Environment In A Circular Economy Context. *Frontiers In Nutrition*, 5, 121.

- Han, J. W., Ruiz-Garcia, L., Qian, J. P., & Yang, X. T. (2018). Food Packaging: A Comprehensive Review And Future Trends. *Comprehensive Reviews In Food Science And Food Safety*, 17(4), 860-877.
- Heidebreder, L. M., Bablok, I., Drews, S., & Menzel, C. (2019). Tackling The Plastic Problem: A Review On Perceptions, Behaviors, And Interventions. *Science Of The Total Environment*, 668, 1077-1093.
- Herrmann, C., Rhein, S., & Sträter, K. F. (2022). Consumers' Sustainability-Related Perception Of And Willingness-To-Pay For Food Packaging Alternatives. *Resources, Conservation And Recycling*, 181, 106219.
- Hoogland, C. T., De Boer, J., & Boersema, J. J. (2007). Food And Sustainability: Do Consumers Recognize, Understand And Value On-Package Information On Production Standards?. *Appetite*, 49(1), 47-57.
- Ischen, C., Meijers, M. H., Vandeberg, L., & Smit, E. G. (2022). Seen As Green? Assessing The Salience And Greenness Of Environmentally Friendly Packaging Cues. *Journal Of Food Products Marketing*, 28(1), 31-48.
- Jacobsen, L. F., Pedersen, S., & Thøgersen, J. (2022). Drivers Of And Barriers To Consumers' Plastic Packaging Waste Avoidance And Recycling—A Systematic Literature Review. *Waste Management*, 141, 63-78.
- Kakadellis, S., Woods, J., & Harris, Z. M. (2021). Friend Or Foe: Stakeholder Attitudes Towards Biodegradable Plastic Packaging In Food Waste Anaerobic Digestion. *Resources, Conservation And Recycling*, 169, 105529.
- Kamleitner, B., Thürridl, C., & Martin, B. A. (2019). A Cinderella Story: How Past Identity Salience Boosts Demand For Repurposed Products. *Journal Of Marketing*, 83(6), 76-92.
- Keller, J., Scagnetti, C., & Albrecht, S. (2022). The Relevance of Recyclability for the Life Cycle Assessment of Packaging Based on Design for Life Cycle. *Sustainability*, 14(7), 4076.
- Ketelsen, M., Janssen, M., & Hamm, U. (2020). Consumers' Response To Environmentally-Friendly Food Packaging-A Systematic Review. *Journal Of Cleaner Production*, 254, 120123.
- Klaiman, K., Ortega, D. L., & Garnache, C. (2016). Consumer Preferences And Demand For Packaging Material And Recyclability. *Resources, Conservation And Recycling*, 115, 1-8.

- Lens, W. (1986). Future Time Perspective: A Cognitive-Motivational Concept. In *Frontiers Of Motivational Psychology* (Pp. 173-190). Springer, New York, Ny.
- Liberman, N., & Trope, Y. (1998). The Role Of Feasibility And Desirability Considerations In Near And Distant Future Decisions: A Test Of Temporal Construal Theory. *Journal Of Personality And Social Psychology*, 75(1), 5.
- Liem, D. G., In't Groen, A., & Van Kleef, E. (2022). Dutch Consumers' Perception Of Sustainable Packaging For Milk Products, A Qualitative And Quantitative Study. *Food Quality And Preference*, 102, 104658.
- Lindh, H., Olsson, A., & Williams, H. (2016). Consumer Perceptions Of Food Packaging: Contributing To Or Counteracting Environmentally Sustainable Development?. *Packaging Technology And Science*, 29(1), 3-23.
- Maglio, S. J., & Trope, Y. (2019). Temporal orientation. *Current Opinion in Psychology*, 26, 62-66.
- Magnier, L., & Schoormans, J. (2015). Consumer Reactions To Sustainable Packaging: The Interplay Of Visual Appearance, Verbal Claim And Environmental Concern. *Journal Of Environmental Psychology*, 44, 53-62.
- Magnier, L., Schoormans, J., & Mugge, R. (2016). Judging A Product By Its Cover: Packaging Sustainability And Perceptions Of Quality In Food Products. *Food Quality And Preference*, 53, 132-142.
- Magnier, L., Mugge, R., & Schoormans, J. (2019). Turning Ocean Garbage Into Products—Consumers' Evaluations Of Products Made Of Recycled Ocean Plastic. *Journal Of Cleaner Production*, 215, 84-98.
- Martinho, G., Pires, A., Portela, G., & Fonseca, M. (2015). Factors Affecting Consumers' Choices Concerning Sustainable Packaging During Product Purchase And Recycling. *Resources, Conservation And Recycling*, 103, 58-68.
- Meherishi, L., Narayana, S. A., & Ranjani, K. S. (2019). Sustainable Packaging For Supply Chain Management In The Circular Economy: A Review. *Journal Of Cleaner Production*, 237, 117582.
- Meng, M. D., & Leary, R. B. (2021). It Might Be Ethical, But I Won't Buy It: Perceived Contamination Of, And Disgust Towards, Clothing Made From Recycled Plastic Bottles. *Psychology & Marketing*, 38(2), 298-312.

- Merlino, V. M., Brun, F., Versino, A., & Blanc, S. (2020). Milk Packaging Innovation: Consumer Perception And Willingness To Pay. *Aims Agric Food*, 5, 307-326.
- Nuojuua, S., Pahl, S., & Thompson, R. (2022). Ocean Connectedness And Consumer Responses To Single-Use Packaging. *Journal Of Environmental Psychology*, 81, 101814.
- Nuttin, J. (2014). *Future Time Perspective And Motivation: Theory And Research Method*. Psychology Press.
- Orlowski, M., Lefebvre, S., & Back, R. M. (2022). Thinking Outside The Bottle: Effects Of Alternative Wine Packaging. *Journal Of Retailing And Consumer Services*, 69, 103117.
- Orset, C., Barret, N., & Lemaire, A. (2017). How Consumers Of Plastic Water Bottles Are Responding To Environmental Policies?. *Waste Management*, 61, 13-27.
- Packaging 360°. Counteroffensive To “Plastic Bashing”. Available At <https://www.packaging-360.com/en/current-topics/counteroffensive-to-plastic-bashing/> Lastly Accessed On May 2022.
- Petkoska, A. T., Daniloski, D., D'cunha, N. M., Naumovski, N., & Broach, A. T. (2021). Edible Packaging: Sustainable Solutions And Novel Trends In Food Packaging. *Food Research International*, 140, 109981.
- Raheem, D. (2013). Application Of Plastics And Paper As Food Packaging Materials-An Overview. *Emirates Journal Of Food And Agriculture*, 177-188.
- Reczek, R. W., Trudel, R., & White, K. (2018). Focusing On The Forest Or The Trees: How Abstract Versus Concrete Construal Level Predicts Responses To Eco-Friendly Products. *Journal Of Environmental Psychology*, 57, 87-98.
- Rees, W., Tremma, O., & Manning, L. (2019). Sustainability Cues On Packaging: The Influence Of Recognition On Purchasing Behavior. *Journal Of Cleaner Production*, 235, 841-853.
- Reisch, L., Eberle, U., & Lorek, S. (2013). Sustainable Food Consumption: An Overview Of Contemporary Issues And Policies. *Sustainability: Science, Practice And Policy*, 9(2), 7-25.
- Rettie, R., & Brewer, C. (2000). The Verbal And Visual Components Of Package Design. *Journal Of Product & Brand Management*.
- Rokka, J., & Uusitalo, L. (2008). Preference For Green Packaging In Consumer Product Choices—Do Consumers Care?. *International Journal Of Consumer Studies*, 32(5), 516-525.

- Ruokamo, E., Räisänen, M., & Kauppi, S. (2022). Consumer Preferences For Recycled Plastics: Observations From A Citizen Survey. *Journal Of Cleaner Production*, 134720.
- Russell, D. A. (2014). Sustainable (Food) Packaging—An Overview. *Food Additives & Contaminants: Part A*, 31(3), 396-401.
- Samant, S. S., & Seo, H. S. (2016). Quality Perception And Acceptability Of Chicken Breast Meat Labeled With Sustainability Claims Vary As A Function Of Consumers' Label-Understanding Level. *Food Quality And Preference*, 49, 151-160.
- Schifferstein, H. N., Fenko, A., Desmet, P. M., Labbe, D., & Martin, N. (2013). Influence Of Package Design On The Dynamics Of Multisensory And Emotional Food Experience. *Food Quality And Preference*, 27(1), 18-25.
- Schuldt, J. P. (2013). Does Green Mean Healthy? Nutrition Label Color Affects Perceptions Of Healthfulness. *Health Communication*, 28(8), 814-821.
- Siddique, R., Khatib, J., & Kaur, I. (2008). Use Of Recycled Plastic In Concrete: A Review. *Waste Management*, 28(10), 1835-1852.
- Siraj, A., Taneja, S., Zhu, Y., Jiang, H., Luthra, S., & Kumar, A. (2022). Hey, Did You See That Label? It's Sustainable!: Understanding The Role Of Sustainable Labelling In Shaping Sustainable Purchase Behaviour For Sustainable Development. *Business Strategy And The Environment*.
- Songa, G., Slabbinck, H., Vermeir, I., & Russo, V. (2019). How Do Implicit/Explicit Attitudes And Emotional Reactions To Sustainable Logo Relate? A Neurophysiological Study. *Food Quality And Preference*, 71, 485-496.
- Steenis, N. D., Van Herpen, E., Van Der Lans, I. A., Ligthart, T. N., & Van Trijp, H. C. (2017). Consumer Response To Packaging Design: The Role Of Packaging Materials And Graphics In Sustainability Perceptions And Product Evaluations. *Journal Of Cleaner Production*, 162, 286-298.
- Steenis, N. D., Van Der Lans, I. A., Van Herpen, E., & Van Trijp, H. C. (2018). Effects Of Sustainable Design Strategies On Consumer Preferences For Redesigned Packaging. *Journal Of Cleaner Production*, 205, 854-865.
- Steenis, N. D., Van Herpen, E., Van Der Lans, I. A., & Van Trijp, H. C. (2022). Partially Green, Wholly Deceptive? How Consumers Respond To (In) Consistently Sustainable Packaged Products In The Presence Of Sustainability Claims. *Journal Of Advertising*, 1-20.

- Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of personality and social psychology*, 66(4), 742.
- Strobel, M., Tumasjan, A., Spörrle, M., & Welp, I. M. (2013). The Future Starts Today, Not Tomorrow: How Future Focus Promotes Organizational Citizenship Behaviors. *Human Relations*, 66(6), 829-856.
- Tangari, A. H., & Smith, R. J. (2012). How the temporal framing of energy savings influences consumer product evaluations and choice. *Psychology & Marketing*, 29(4), 198-208.
- Taufik, D., Reinders, M. J., Molenveld, K., & Onwezen, M. C. (2020). The Paradox Between The Environmental Appeal Of Bio-Based Plastic Packaging For Consumers And Their Disposal Behaviour. *Science Of The Total Environment*, 705, 135820.
- Testa, F., Di Iorio, V., Cerri, J., & Pretner, G. (2021). Five Shades Of Plastic In Food: Which Potentially Circular Packaging Solutions Are Italian Consumers More Sensitive To. *Resources, Conservation And Recycling*, 173, 105726.
- Triantafyllou, V. I., Karamani, A. G., Akrida-Demertzi, K., & Demertzis, P. G. (2002). Studies On The Usability Of Recycled Pet For Food Packaging Applications. *European Food Research And Technology*, 215(3), 243-248.
- Urien, B., & Kilbourne, W. (2011). Generativity and self-enhancement values in eco-friendly behavioral intentions and environmentally responsible consumption behavior. *Psychology & marketing*, 28(1), 69-90.
- Underwood, R. L., Klein, N. M., & Burke, R. R. (2001). Packaging Communication: Attentional Effects Of Product Imagery. *Journal Of Product & Brand Management*.
- Vila-Lopez, N., & Küster-Boluda, I. (2020). A Bibliometric Analysis On Packaging Research: Towards Sustainable And Healthy Packages. *British Food Journal*.
- Walker, T. R., McGuinity, E., Charlebois, S., & Music, J. (2021). Single-Use Plastic Packaging In The Canadian Food Industry: Consumer Behavior And Perceptions. *Humanities And Social Sciences Communications*, 8(1), 1-11.
- Wensing, J., Caputo, V., Carraresi, L., & Bröring, S. (2020). The Effects Of Green Nudges On Consumer Valuation Of Bio-Based Plastic Packaging. *Ecological Economics*, 178, 106783.

- Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology*, 77, 1271–1288.
- Zeng, T., & Durif, F. (2019). The Influence Of Consumers' Perceived Risks Towards Eco-Design Packaging Upon The Purchasing Decision Process: An Exploratory Study. *Sustainability*, 11(21), 6131.
- Zhu, Z., Liu, W., Ye, S., & Batista, L. (2022). Packaging Design For The Circular Economy: A Systematic Review. *Sustainable Production And Consumption*.

Appendix A

Stimuli used in study 1



Appendix B

Stimuli used in study 2a



Appendix C

Stimuli used in study 2b



Paper III - Tell me more and make me feel proud: the role of eco-labels and informational cues on consumers' food perceptions

Abstract

Purpose

The objective of the present research is to identify the impact of food-related and packaging-related eco-labels on consumers' perceptions of food quality and safety when an ecological claim, which explains the eco-label meaning, is provided.

Design/methodology/approach

One survey ($N = 472$) plus one experimental lab study were used to test the hypotheses drawn from the elaboration likelihood model. The research employed a 2 (eco-label: MSC vs FSC) \times 2 (ecological claim: present vs absent) between-subjects design plus a control condition (i.e. absence of eco-label).

Findings

When the ecological claim is absent, only food-related eco-labels were found to generate a higher food evaluation. However, when the ecological claim is present, both eco-label types (i.e. food-related and packaging-related) increased food perceptions of quality and safety because of higher feelings of pride.

Originality/value

From a theoretical perspective, this research identifies both food- and packaging-related eco-labels as extrinsic cues able to affect consumers' perception of food quality and safety. Moreover, the findings of this study present practical implications for package design and health policymaking.

Keywords Food related eco-labels; Packaging-related eco-labels; Food evaluations; Ecological claims, Pride

1. Introduction

Consumers are becoming increasingly concerned about environmental impacts of food production and consumption (Sala *et al.*, 2017), as the food industry is responsible for almost 30% of the environmental impact of total consumption (Notarnicola *et al.*, 2017). Consequently, both retailers and food manufacturers are changing their production models to ensure higher sustainability. The presence of eco-labels on food packages is the result of these production changes, and the aim is to inform consumers about the sustainable features of products (Grankvist and Biel, 2001), offering the opportunity to consider ethical aspects connected to production that would otherwise be uncertain or undervalued (Grunert *et al.*, 2014). Indeed, eco-labels are defined as green marketing tools aimed at visually informing customers about the sustainable features of products, in order to facilitate conscious decision-making, which in turn stimulates demand for ecological products (Potter *et al.*, 2021; Eldesouky *et al.*, 2020; Thøgersen *et al.*, 2010). The role of eco-labeling is twofold: On the one hand, it represents an *ecological innovation tool* that functions as a trigger for firms to adopt respectful production methods in order to keep their competitive position in the market (Wagner, 2008; Prieto-Sandoval *et al.*, 2016). On the other hand, it is an *informative tool* that reduces information asymmetries among producers and consumers (Marchini *et al.*, 2021; Liu *et al.*, 2021; Van Amstel *et al.*, 2008).

Sustainable labeling can either be mandatory – i.e. prescribed by law – or voluntary. The latter involves the three types of eco-labels defined by the International Standards Organization (ISO) as Type I (ISO 14024), third-party certified schemes recognizable through a logo; Type II (ISO 14021), self-declared environmental claims and Type III (ISO 14025), environmental declarations based on life-cycle assessments (Horne, 2009; Miranda-Ackerman *et al.*, 2017; Iraldo *et al.*, 2020). Type I-like labels, checked by non-state actors, are particularly relevant in the domain of food consumption, in which there are many eco-labels that cover only one specific aspect of sustainability, as for instance fair trade, carbon footprint, organic or local production, animal welfare and environmental protection (Grunert, 2011). For example, the Marine Stewardship Council (MSC; www.msc.org) and the

Aquaculture Stewardship Council (ASC; www.asc-aqua.org) certify that fish and marine ecosystems are respected, monitoring aquaculture practices and species' biodiversity and habitat. Conversely, the Forest Stewardship Certification (FSC; www.fsc.org) and the Program for Endorsement of Forest Classification (PEFC; www.pefc.org) certify that food packaging is made of wood or paper taken from sustainably managed forests, recycled materials or both. Consequently, in the food industry, eco-labels may certify that the food itself or its packaging is produced sustainably, leading to a distinction between *food-related labels*, such as the MSC and ASC labels, and *packaging-related labels*, such as the FSC and PEFC labels. Food-related labels (i.e. eco-labels associated with the food product) have received extensive attention in previous research (Thøgersen *et al.*, 2010; Uchida *et al.*, 2014; Bronnmann and Asche, 2017; Risius *et al.*, 2017). However, whereas some contributions underlined their positive effect in terms of food evaluations (e.g. Sörqvist *et al.*, 2013, 2015), others found a sort of “eco-penalty” in which eco-labeled products are perceived as having low quality (e.g. Delmas and Lessem, 2017; Abraben *et al.*, 2017). It follows that the effect of food-related eco-labels on food perceptions needs further investigation. The first objective of the present research is to determine whether the presence of food-related eco-labels positively affects food evaluations in term of perceived quality and perceived safety.

On the other hand, packaging-related labels (i.e. eco-labels that inform customers about the sustainability of packaging, not of food) have been mostly explored in the domain of sustainable wood-based products (O'Brien and Teisl, 2004; Testa *et al.*, 2015; Panico *et al.*, 2018). Their impact in shaping consumers' preferences for food seems to have been overlooked, with very few recent exceptions (e.g. Lestari *et al.*, 2020). However, packaging-related eco-labels are equally able to modify food evaluations, as the usage of sustainable packaging cues has been demonstrated to positively affect perceived food quality, authenticity and satiation (e.g. Magnier *et al.*, 2016; Marozzo *et al.*, 2020; Donato *et al.*, 2021). For example, Magnier *et al.* (2016) demonstrated that packaging sustainability positively affects consumers' perceptions of food quality and naturalness; Marozzo *et al.* (2020) found that packaging that adopts natural colors increases

perceptions of food authenticity and Donato *et al.* (2021) found that the use of sustainable packaging increases perceived satiation of healthy foods because of higher perceived food quality.

Similarly, it is possible that the adoption of packaging-related eco-labels can positively affect food evaluation. Therefore, the present research aims to clarify whether, in the food domain, eco-labels can truly be effective in triggering positive food evaluations in terms of quality and safety, and which type of eco-label (i.e. food-related vs packaging-related) is more effective and under which circumstances. This issue is particularly relevant, as both food-related and packaging-related eco-labels are growing exponentially in the food market. For example, in 2020, there were more than 18,000 MSC-labeled products, and more than 130,000 FSC labels were used by certificate holders (MSC Annual Report 2019–20; FCS Annual Report 2019).

We propose that both food- and packaging-related eco-labels positively affect food perceptions via feelings of pride, a positive emotion felt when one succeeds at a socially valued endeavor (Philippot and Feldam, 2004). Moreover, we propose that this relationship is moderated by the presence of additional information (i.e., ecological claims) aimed at explaining the meaning of the eco-label.

In line with dual-process theories, through an experimental study, we show that when additional information about the meaning of eco-labels is not displayed on the food package (i.e. presence of eco-label only), food-related eco-labels (i.e. MSC) are more effective than packaging-related eco-labels (i.e. FSC), disconfirming potential eco-penalty effects. Interestingly, when additional information about the meaning of eco-labels is provided, both food-related eco-labels (i.e. MSC) and packaging-related eco-labels (i.e. FSC) positively affect consumers' food evaluations in terms of perceived quality and perceived safety, via feelings of pride.

These findings implicitly show that consumers are still not completely aware of eco-labels, emphasizing the pivotal role in food evaluation played by additional information about the meaning of eco-labels on food packaging. Notably, our results highlight cases in which not only food-related but also packaging-related eco-labels positively affect food consumers' perceptions, identifying eco-

labels as extrinsic cues that can implicitly affect food evaluations. Finally, this research identifies the role of positive emotions, and specifically pride, in explaining the choice of certified food packages. The remainder of this article is organized as follows. First, we develop the conceptual background and research hypotheses by focusing on the importance of eco-labels for consumers' food evaluations and the importance of their awareness. Subsequently, we report the empirical evidence that provides support for our conceptualization. Finally, we present the theoretical and practical implications of our results and discuss both limitations and directions for further research.

2. Theoretical background and hypothesis development

2.1 Eco-labels and food perceptions

The focal objective of food firms is to satisfy consumers' demand in terms of food quality, safety and environmental attributes, all of which can be all communicated with labeling (Marchini *et al.*, 2021). Consumers' perceptions of food quality and safety are shaped from signals and informational cues even before the moment of purchase; individuals form judgments on whether the perceived features will satisfy their set goals or values (Grunert, 2005). While the direct role of food-related eco-labeling in predicting consumers' attitudes toward sustainability has been widely explored (e.g. Cerri *et al.*, 2018; Eldesouky *et al.*, 2020; Hoek *et al.*, 2017), relatively few studies have focused on the effect that eco-labeling has on food perceived quality and safety, and these have provided contrasting results. For instance, Van Doorn and Verhoef (2011) claimed that sustainable food may lead to potential negative quality perception and lower willingness to pay, and a corresponding “eco-penalty” has been noted by Delmas and Lessem (2017) and by Abraben *et al.* (2017) in the wine market. Conversely, Sörqvist *et al.* (2013) demonstrated that when consumers are given two cups of the same coffee, but told that only one of the two is eco-friendly, they tend to prefer the taste of the sustainable coffee and show a higher willingness to pay for it. Similar results have also been found for other eco-labeled product categories: wine (Wiedmann *et al.*, 2014), fruits (Sörqvist *et al.*, 2015) yogurts and potato chips (Lee *et al.*, 2013), and seafood (Vitale *et al.*, 2020).

To our knowledge, very few studies have sought to uncover the impact of packaging-related eco-labels in shaping consumers' food preferences. Lestari *et al.* (2020) found that FSC labels have a significant positive impact on attitude toward green-packaged ready-to-drink beverages. Similar results were found by Rokka and Uusitalo (2008), suggesting a clear preference for recyclable-labeled carton package when choosing among functional drink products. However, the authors did not infer any relationship about packaging sustainability and perceived product quality or safety. In general, consumers seem to value packaging sustainability cues (Popovic *et al.*, 2019; Herbes *et al.*, 2018; Magnier and Schoormans, 2017; Rebollar *et al.*, 2017; Magnier *et al.*, 2016). Recently, Steenis *et al.* (2017) showed that sustainable packaging can enhance perceptions of food quality and taste; Magnier *et al.* (2016) found that the usage of sustainable packaging materials can increase perceived food quality and Donato *et al.* (2021) found that sustainable packaging positively influences healthy foods' perceived satiation via perceived quality. Therefore, previous research suggests that sustainability cues drive perceptions of food quality and safety regardless of whether the environmental information transferred through the label relates to the product itself (food-related label) or to its packaging (packaging-related label). Consequently, it is reasonable to assume that a food package with an eco-label, regardless of whether it is food- or packaging-related, is better evaluated in terms of perceived quality and safety than the same food package without an eco-label. Formally:

H1. Compared to the absence of eco-labels, the presence of either a food- or a packaging-related eco-label generates (a) higher perceived food quality and (b) higher perceived food safety.

In terms of the comparison between food- and packaging-related eco-labels, previous research seems to suggest that both can positively affect food evaluation (e.g. Sörqvist *et al.*, 2013; Wiedmann *et al.*, 2014; Lestari *et al.*, 2020). Even in the wine market, recent contributions have demonstrated the absence of an eco-penalty at the mean level, despite the fact that a small consumer segment dislikes eco-labels (Lim and Reed, 2020). However, it is reasonable to expect that food-related (vs packaging-

related) eco-labels are more likely to increase food evaluations given the higher perceived fit with the labeled food product. Prior literature describes fit as the perceived link between two attributes or objects (Sen and Bhattacharya, 2001). Therefore, an eco-label that explicitly refers to a food product (vs a packaging-related eco-label) will be perceived as better fitting that product and will therefore be better able to affect perceived food quality and safety. Formally:

H2. Compared to packaging-related eco-labels, the presence of food-related eco-labels generates (a) higher perceived food quality and (b) higher perceived food safety.

2.2 The mediating role of pride

Sustainable consumption choices are not fully rational as predicted by traditional theories of cognitive evaluations and utility maximization (Luchs *et al.*, 2015). In fact, an important role in explaining sustainable consumption is played by self-conscious emotions, such as pride, guilt, shame and embarrassment (Trudel, 2019). These emotions arise as a consequence of self-evaluation of a specific action against an individual's standards or goals; people feel responsible for a certain action and then assess whether behavior is consistent with internalized standards, thus leading to positive or negative emotions, respectively, in case of success or failure (Lewis, 1995).

The literature in the field of sustainable consumption has already explored the role of self-conscious emotions in triggering green or socially responsible choices, mostly focusing on negative emotions such as guilt and shame (e.g. Amatulli *et al.*, 2019; Lindenmeier *et al.*, 2017; Pelozo *et al.*, 2013) or simultaneously exploring the impact of guilt and pride (Antonetti and Maklan, 2014a, b; Onwezen *et al.*, 2013, 2014a, b; Schneider *et al.*, 2017). Pride, in particular, defined as a positive emotion associated with a sense of achievement and self-worth (Antonetti and Maklan, 2014a) has been demonstrated to be more effective in predicting sustainable consumption (e.g. Onwezen *et al.*, 2014b; Patrick *et al.*, 2009) than its negative counterpart, guilt. Indeed, pride boosts an individual's sense of agency, which stimulates consumers to see themselves as responsible for solving issues of sustainability, thereby making it more difficult to implement unethical behavior (Antonetti and

Maklan, 2014b). Recently, in the food domain, Kim and Huang (2021) demonstrated a strong association between local food consumption and consumer pride in restaurant contexts. Additionally, Antonetti and Maklan (2014a) proposed a theoretical model of pride appraisal according to which credibility of the ethical claim and social visibility are key features that activate feelings of pride. As a result, when exposed to clear and credible sustainability claims on food packaging – in the form of a third-party certified eco-label – consumers who select the sustainable option are more likely to feel proud of their choice. Therefore, it is reasonable to assume that the positive relationship between eco-labels and food evaluations is explained by feelings of pride that implicitly enrich consumers' food perceptions in terms of quality and safety.

However, especially in the food domain, consumers seem to have limited knowledge of eco-labels (Boesen *et al.*, 2019), and they are not aware of the different aspects of sustainability that these informative tools may cover (Hoek *et al.*, 2021). In fact, each eco-label may refer to a different pillar of sustainability (e.g. social, economic, or environmental), and there is still no complete institutional categorization of all eco-labels available within a specific country or business sector. This, in turn, causes a general limited understanding of sustainable labels (Calderon-Monge *et al.*, 2020). The majority of consumers worldwide are still unaware of eco-label logos (Eldesouky *et al.*, 2020) or are unable to recognize the sustainable attributes that are certified; however, the presence of clear, precise and relevant information about the implications of eco-labels can positively trigger higher levels of motivation toward responsible purchasing (Calderon-Monge *et al.*, 2020). As a consequence, the presence of additional information, aimed at better explaining the ecological meaning of the associated eco-label (hereafter: *ecological claim*), might help consumers to better understand its value, with a consequent higher evaluation of the labeled food.

Therefore, we propose that when an ecological claim is available, it will positively affect the relationship between eco-label type and food evaluation, through feelings of pride.

Our predictions are based on dual-process theories of persuasive communication (e.g. the elaboration likelihood model, Petty and Cacioppo, 1981; and the heuristic-systematic model, Chaiken,

1980), according to which consumers can process information based either on a central route (characterized by a substantial cognitive effort) or on a peripheral route (which implies mental shortcuts). While the central route requires consumers to have high motivation and ability to process information and therefore make a careful evaluation of all the information available, the peripheral route demands low motivation and information processing ability and therefore allows the possibility of referring to heuristics in making judgments.

Where there is no ecological claim, information coherence between eco-labels is established during food evaluation; since consumers have no complete information about the eco-label, they will follow a peripheral route, using pride associated with food-related eco-labels as a heuristic. Under such conditions, the perceived fit of eco-label type (food-related vs packaging-related) and food product is recognized, and it will increase food evaluation via feelings of pride. As a consequence, where there is no ecological claim, we expect food-related eco-labels (vs packaging-related eco-labels) to increase individuals' feelings of pride, which will, in turn, stimulate better food evaluation.

Conversely, when ecological claims are available, consumers are perfectly conscious of eco-labels, meaning that they will follow a central route without using feelings of pride as a heuristic. Under such conditions, the coherence of eco-label type (food-related vs packaging-related) is less relevant, as consumers are able to understand the ecological benefits of both labels. Therefore, when ecological claims are present, we expect no difference in feelings of pride between the two types of eco-labels or in terms of food evaluations (see Figure 1).

To summarize, we hypothesize that the higher food evaluation in terms of perceived quality and safety triggered by the presence of either food- or packaging-related eco-labels (H1) is explained by feelings of pride. However, this relationship is affected by the presence of ecological claims aimed at better explaining the meaning of either food-related or packaging-related eco-labels. When ecological claims are not present, food-related eco-labels generate a higher perceived food quality and safety than packaging-related eco-labels; when ecological claims are present, both eco-labels increase food evaluations via feelings of pride. Formally:

H3. The presence of an ecological claim moderates the relationship between usage of eco-labels (food-related vs packaging-related) and (a) perceived food quality and (b) perceived food safety, via feelings of pride.

We tested our conceptual framework in two studies. First, a pretest was conducted with a twofold objective: first, to select food-related vs packaging-related eco-labels for use in the experimental study, and second, to assess consumers' recognition of eco-labels. Subsequently, to test the research hypotheses, we conducted an experimental study in which we presented the selected eco-labels on a food package (i.e. a pack of frozen cod fillets) and measured consumers' food perceptions (i.e. perceived food quality and perceived food security).

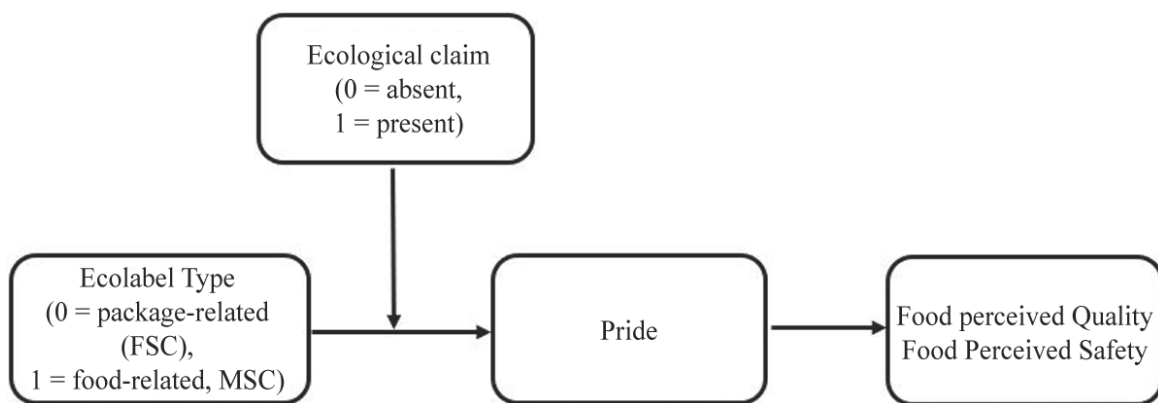


Figure 1 – The conceptual model

3. Pretest

3.1 Pretest procedure and measures

A sample of 472 Italian consumers (306 women, $M_{age} = 49.84$, $SD = 13.39$) selected from an online platform (Winnerland.com) participated in the study in exchange for a small reward. The sample consisted mainly of employees (40.8%), followed by unemployed people (17.8%), retired people (16.5%), freelance workers (8.7%) and students (1.5%); a further 14.8% of respondents preferred not to report their professional status. Most of the respondents had a high school education (16.3% with a middle school diploma and 55.8% with a high school diploma). A smaller proportion were

university-educated (7.4% with a bachelor's degree and 17.5% with a master's degree), and only a small number (3%) declared being educated to PhD or MBA level.

The participants were first informed that they had to evaluate a series of logos without any mention of the specific product category. Then, they were shown four eco-labels at random: two eco-labels related to fishing safeguards (i.e. food-related eco-labels from the MSC and ASC) and two eco-labels related to forestry safeguarding (i.e. packaging-related eco-labels from the FSC and the PEFC; see Appendix 1). We used these labels not only because they are related to the same concept (safeguarding of fishing and forestry, respectively) but also because they are quite common in Italian food retailing and are comparable in terms of color (blue for MSC and ASC, green for FSC and PEFC) and symbols (a fish for MSC and ASC, a tree for FSC and PEFC). For each eco-label, the participants were asked to report whether they had ever seen the logo (yes or no) and the product category to which it belonged (i.e. food, stationery items, do not know). Then, the participants were asked to indicate how much they liked the eco-label by responding to one item using a seven-point Likert scale (1 = not at all, 7 = a lot) and to indicate their environmental concern by answering three items using a Likert scale adapted from Luchs and Mooradian (2012; $\alpha = 0.91$). Finally, the participants were asked demographic questions regarding age, gender, education and job title and were thanked for their participation.

3.2 Pretest results

The results indicated an average environmental concern of the sample of 5.97 (SD = 1.12), with women significantly more concerned than men ($M_{\text{Female}} = 6.11$, SD = 1.06; $M_{\text{Male}} = 5.72$, SD = 1.19; $t(308.37) = -3.48$, $p = 0.001$). However, the latter result might be influenced by the lack of gender balance in the sample (306 women and 106 men). There was no statistically significant difference between educational level and environmental concerns ($F(4,467) = 0.66$, $p = 0.62$).

In terms of recognizing eco-labels, 41% of the participants had previously seen the MSC eco-label and correctly associated it with food, whereas only 15.2% associated the ASC eco-label with food.

The FSC eco-label was recognized by 49% of the participants, and 15.2% reported that it is used for stationery items (i.e. items that can usually be found in a stationery shop, such as paper envelopes, block notes and paper packages). Of the respondents, 18.6% stated that they had seen the PEFC eco-label, but only 3.4% knew that it is related to stationery items; among participants who had never seen the logo, 19.7% declared that it could be used for stationery items (see Table 1 for further details). In general, these results suggest that the MSC and FSC labels are more familiar than the ASC ($\chi^2 (471) = 125.82, p < 0.001$) and PEFC labels ($\chi^2 (471) = 34.38, p < 0.001$).

The results of a repeated measures analysis of variance (ANOVA) confirmed that except for FSC and ASC ($\Delta = 0.044$; $ES = 0.05, p = 1.00$), all the eco-labels differed significantly in terms of perceived attitude; in particular, the MSC eco-label was perceived as significantly more appealing than the FSC one ($\Delta = 0.21$; $ES = 0.06, p = 0.001$).

As a consequence, the MSC and FSC labels were selected as the food-related and packaging-related eco-labels for the main study.

	MSC		ASC		FSC		PEFC	
Knowledge (yes/no)	Yes 41%	No 59%	Yes 23.7%	No 76.3%	Yes 49%	No 51%	Yes 18.6%	No 81.4%
Food belongingness	29.8%	38.9%	15.2%	44.6%	2.3%	5.1%	1.3%	8.2%
Stationary items belongingness	1.3%	0%	0%	2.1%	15.2%	10.1%	3.4%	19.7%
Unknown	68.9%	61.1%	84.8%	53.3%	82.5%	84.8%	95.3%	72.1%
Attitude mean	4.99 (SD = 1.52)		4.74 (SD = 1.53)		4.78 (SD = 1.53)		4.51 (SD = 1.57)	

Table 1 - Summary of Pre-test Results

4. Experimental study

4.1 Design and measures

We conducted an experimental lab study to test H1, H2 and H3. We used a 2 (eco-label: MSC vs FSC) \times 2 (ecological claim: present vs absent) between-subjects design plus a control condition (i.e. absence of eco-label and ecological claim). A total of 207 students at a large Italian university (140 women, $M_{\text{age}} = 21.92$, $SD = 3.11$) participated in the study in exchange for a bonus course credit.

The participants were assigned at random to one of five experimental scenarios: a picture of a pack of frozen cod fillets of a fictitious brand (BER SEA) with (vs without) an eco-label (MSC vs FSC) and presenting (vs not presenting) an ecological claim close to the eco-label. We decided not to include a control condition for the presence of claim because our aim is to verify whether explaining the meaning of the eco-label (through the verbal claim) could affect products evaluation. Therefore, the presence (vs. absence) of the verbal claim cannot be assessed independently from the label to which it refers. We selected this product category as we expected students to be familiar with it, since frozen fish is often bought for convenience. The ecological claim, when present, was coherent with the eco-label shown; in the case of the MSC eco-label, the ecological claim was “By buying this product you will contribute to safeguarding the marine ecosystem. Find out more at www.msc.org,” whereas in the case of the FSC eco-label, the ecological claim was “By buying this product you will contribute to safeguarding the world's forests. Find out more at www.fsc.org.” In each condition, we set the exposure time for the experimental scenarios to a minimum of 20 s to ensure that all the relevant information contained in each scenario's description was read and understood by the participants (see Appendix 2).

Perceived food quality and perceived food safety (our dependent variables) were then measured. Perceived quality was measured using five items on a seven-point Likert scale adapted from White *et al.* (2016; $\alpha = 0.90$, $M = 3.91$, $SD = 1.24$), and perceived safety was measured using seven items on a seven-point Likert scale adapted from Seo and Yun (2015; $\alpha = 0.86$, $M = 4.41$, $SD = 1.26$). Following the same procedure as Antonetti and Maklan (2014a), we asked the participants to indicate

the extent to which buying the food package previously shown would make them feel proud (1 = not at all, 7 = a lot) and guilty (1 = not at all, 7 = a lot). Then, they were asked about their environmental concerns using six items adapted from Magnier *et al.* (2016) and measured on a seven-point Likert scale (1 = not at all, 7 = a lot; $\alpha = 0.92$, $M = 5.93$, $SD = 1.07$). Finally, the participants answered two manipulation checks for eco-label presence (“The food package previously shown contained an eco-label,” 1 = not present, 7 = present) and eco-label type (“The food package previously shown contained the [...],” 1 = FSC eco-label; 7 = MSC eco-label), and one manipulation check for ecological claim (“The food package previously shown contained a claim explaining the eco-label function,” 1 = totally disagree, 7 = totally agree). Finally, the respondents answered demographic questions (age and gender) and were debriefed and compensated.

4.2 Experimental study method

Three one-way ANOVAs were conducted to verify that the participants had correctly perceived the proposed manipulations, namely the presence (vs absence) of eco-labels, the MSC vs FSC eco-label and the presence (vs absence) of an ecological claim (this last only for the participants exposed to eco-label conditions).

To test H1 and H2, we conducted two additional one-way ANOVAs for perceived food quality (H1a and H2a) and perceived food safety (H1b and H2b), respectively, and we used the Bonferroni *post hoc* test to analyze contrasts among singular conditions.

Finally, in order to test H3, according to which the presence of an ecological claim moderates the relationships between the presence of eco-labels (food-related vs packaging-related) and perceived food quality (H3a) and perceived food safety (H3b) via feelings of pride, we conducted two moderated mediation analyses (Model 7 of the PROCESS macro; Hayes, 2017). The first analysis took eco-label type as the independent variable (FSC = 0, MSC = 1), the presence of ecological claim as moderator (absent = 0, present = 1), pride as mediator and the perceived food quality as the dependent variable (H3a); the second analysis took the same variables as the first analysis except for

the dependent variable, which was perceived food safety (H3b). In both analyses, we included environmental concern and gender as covariates. Consumers with a high level of environmental concern may show a higher sensitivity toward eco-labels than consumers with low environmental concern. Moreover, since the sample was not balanced in terms of gender (140 women and 67 men), we decided to consider gender as a covariate. We did not consider the role of other demographic variables such as education and age, since the sample was homogeneous in terms of both educational level (undergraduate students) and age (around 22).

4.3 Experimental study results and hypothesis testing

We first verified that the participants had perceived the manipulations correctly. The first manipulation check was related to the presence versus absence of the eco-label on the food package (i.e. “The food package previously shown contained an eco-label,” 1 = not present, 7 = present). The results of a one-way ANOVA showed that the participants had correctly recognized the presence (vs absence) of eco-labels on the food package ($M_{\text{no ecolabel}} = 2.54$, $SD = 1.57$; $M_{\text{MSC}} = 5.51$, $SD = 1.68$; $M_{\text{FSC}} = 5.54$, $SD = 1.77$; $F(1, 204) = 51.13$, $p < 0.001$). A Bonferroni *post hoc* test revealed a significant difference between the absence of eco-label and the MSC conditions ($\Delta = 2.97$, $p < 0.001$) and a significant difference between the absence of eco-label and the FSC conditions ($\Delta = 3.00$, $p < 0.001$), whereas there was no difference between the MSC and FSC conditions in terms of eco-label recognition ($\Delta = 0.03$, $p = 0.90$). Then, for the participants who had been exposed to one of the two eco-labels, we verified correct recognition of the eco-label type (i.e. “The food package previously shown contained [...],” 1 = FSC eco-label, 7 = MSC eco-label). We conducted a second one-way ANOVA that showed correct recognition of the MSC and FSC labels ($M_{\text{MSC}} = 6.20$, $SD = 1.32$; $M_{\text{FSC}} = 3.46$, $SD = 2.32$; $F(1, 156) = 80.06$, $p < 0.001$).

Finally, we verified that the participants had correctly recognized the presence (vs absence) of an ecological claim on the proposed food package (“The food package previously shown contained a claim explaining the eco-label function,” 1 = totally disagree, 7 = totally agree). In this case, too, the

participants correctly recognized the presence (vs absence) of the ecological claim ($M_{\text{No Claim}} = 3.52$, $SD = 1.94$; $M_{\text{Claim}} = 4.81$, $SD = 2.04$; $F(1, 180) = 18.98$, $p < 0.001$). Therefore, we can conclude that our manipulations were successfully perceived, as all the differences were statistically significant and in line with expectations.

In testing H1a, a first one-way ANOVA revealed a significant difference of the presence of eco-labels on perceived food quality ($M_{\text{no ecolabel}} = 3.68$, $SD = 1.12$; $M_{\text{MSC}} = 4.18$, $SD = 1.28$, $M_{\text{FSC}} = 3.78$, $SD = 1.22$; $F(1, 204) = 3.09$, $p = 0.05$). The Bonferroni *post hoc* tests showed no difference in terms of perceived food quality between participants exposed to the food package with FSC and those exposed to the food package with no eco-label ($\Delta = 0.10$, $p = 1.00$), whereas the perceived food quality of participants exposed to the food package with MSC was marginally higher than that of the participants exposed to the food package without any eco-label ($\Delta = 0.50$, $p = 0.10$). Therefore, H1a was not fully supported.

Then, in order to test H1b, we conducted a second one-way ANOVA, taking perceived food safety as the dependent variable. The results revealed a significant difference in terms of perceived safety in the case of presence (vs absence) of eco-labels ($M_{\text{no ecolabel}} = 4.18$, $SD = 1.27$; $M_{\text{MSC}} = 4.76$, $SD = 1.09$, $M_{\text{FSC}} = 4.21$, $SD = 1.33$; $F(1, 204) = 5.02$, $p = 0.007$). Additional Bonferroni *post hoc* tests showed that participants exposed to the food package with the MSC eco-label perceived the food as safer than did the participants exposed to the food package with no eco-label ($\Delta = 0.58$, $p = 0.05$), whereas the difference in terms of perceived safety between participants exposed to the food package with the FSC eco-label and those exposed to the food package with no eco-label was not significant ($\Delta = 0.03$, $p = 1.00$). Consequently, H1b is partially supported in its claim about the efficacy of a food-related eco-label compared to both packaging-related eco-labels and the absence of any eco-label.

In order to test H2a and H2b, we conducted two additional Bonferroni *post hoc* tests. The first test showed that, contrary to H2a, there was no difference in terms of perceived food quality between the MSC and FSC eco-label conditions ($\Delta = 0.40$, $p = 0.11$). The second test showed, in line

with H2b, that there was a significant difference in terms of perceived food safety between the MSC and FSC eco-labels ($\Delta = 0.55, p = 0.01$), indicating that participants perceived food marked with a food-related eco-label as significantly safer than the same food marked with a packaging-related eco-label. Compared to the absence of an eco-label, only food-related eco-labels (i.e. MSC) partially affected consumer's food perceptions in terms of quality and safety, while the usage of packaging-related eco-labels (i.e. FSC) produced no difference (see Table 2).

DV	M _{MSC}	M _{FSC}	M _{No eco-label}	Test
Food Perceived Quality	4.18 (SD = 1.28)	3.78 (SD = 1.22)	3.68 (SD = 1.12)	$F(1,204) = 3.09, p = .05$
Food Perceived Safety	4.76 (SD = 1.09)	4.21 (SD = 1.33)	4.18 (SD = 1.27)	$F(1,204) = 5.02, p < .01$
Bonferroni Post-Hoc Test				
Food Perceived Quality	$\Delta_{MSC_No\ eco-label} = .50$ $p = .10$		$\Delta_{FSC_No\ eco-label} = .10$ $p = ns$	$\Delta_{MSC_FSC} = .40$ $p = ns$
Food Perceived Safety	$\Delta_{MSC_No\ eco-label} = .58$ $p = .05$		$\Delta_{FSC_No\ eco-label} = .03$ $p = ns$	$\Delta_{MSC_FSC} = .55$ $p = .01$

Table 2 - Summary of Experimental Study Results (H1-H2)

In order to test H3, we ran two mediation moderation analyses (Model 7 of the PROCESS macro; Hayes, 2017). The first mediation moderation analysis tested H3a and took food perceived quality as the dependent variable, while the second tested H3b and took food perceived safety as the dependent variable.

The results of the first mediation moderation analysis showed that eco-label type ($b = 0.38, se = 0.24; t = 1.62; p = 0.10$) and gender ($b = 0.32, se = 0.26; t = 1.24; p = 0.22$) did not influence pride, whereas the presence of ecological claim ($b = 0.48, se = 0.24; t = 2.04, p = 0.04$) and environmental concern ($b = 0.29, se = 0.11; t = 2.61; p < 0.01$) had a positive and significant effect on pride. Moreover, the interaction between eco-label type and ecological claim was significant ($b = -0.96, se = 0.48; t = -2.00, p = 0.05$). In line with our conceptualization, simple slopes analysis showed that where there was no ecological claim, the MSC eco-label generated a higher feeling of

pride than the FSC eco-label ($b = 0.86, p = 0.01$), whereas in the presence of an ecological claim, there was no difference between the two eco-labels in terms of pride ($b = -0.09, p = 0.77$). Taking perceived food quality as the dependent variable, feeling of pride had a significant effect ($b = 0.55, se = 0.05; t = 10.66; p < 0.001$), whereas eco-label type ($b = 0.22, se = 0.16; t = 1.40; p = 0.16$), environmental concern ($b = 0.12, se = 0.07; t = 1.57; p = 0.12$) and gender ($b = -0.18, se = 0.17; t = -1.01; p = 0.31$) did not.

Where the ecological claim was absent, there was a significant indirect conditional effect (0.47) of eco-label type on perceived food quality [95% CI 0.14, 0.78]. Where the ecological claim was present, the indirect conditional effect was not significant [95% CI -0.45, 0.35]. We can thus confirm H3a.

In order to test H3b, we conducted a second mediation moderation analysis using the same variables as in the previous analysis, with the exception of taking perceived food security as the dependent variable. The results demonstrated that the MSC eco-label ($b = 0.86, se = 0.34; t = 2.57; p = 0.01$), the presence of an ecological claim ($b = 0.93, se = 0.32; t = 2.85; p < 0.01$) and environmental concern ($b = 0.29, se = 0.11; t = 2.61; p < 0.01$) significantly and positively affected pride, whereas gender did not ($b = 0.32, se = 0.26; t = 1.24; p = 0.22$). Moreover, the interaction between eco-label type and ecological claim was significant ($b = -0.96, se = 0.48; t = -2.00, p = 0.04$). In line with our conceptualization, simple slopes analysis showed that where there was no ecological claim, the MSC eco-label generated a higher feeling of pride than the FSC eco-label ($b = 0.86, p = 0.01$); where there was an ecological claim, there was no difference between the two eco-labels and feelings of pride ($b = -0.09, p = 0.77$). Taking perceived food safety as the dependent variable, feeling of pride ($b = 0.46, se = 0.05; t = 9.33; p < 0.001$), MSC eco-label ($b = 0.37, se = 0.15; t = 2.47; p = 0.01$) and gender ($b = -0.34, se = 0.16; t = -2.08; p = 0.04$) had a significant effect, whereas environmental concern ($b = 0.12, se = 0.07; t = 1.67; p = 0.09$) did not (see Figure 2).

Where the ecological claim was absent, there was a significant indirect conditional effect (0.39) of eco-labels type on food perceived safety [95% CI 0.11, 0.67]. Where the ecological claim was present, the indirect conditional effect was not significant [95% CI -0.39, 0.29].

We repeated the same mediation moderation analyses taking guilt as mediator, for both perceived food quality and perceived food safety. The results showed a nonsignificant moderated mediation index for both the dependent variables (0.01, [95% CI -0.18, 0.24]; 0.02, [95% CI -0.19, 0.26]), confirming that the proposed effects were guided by pride and not by guilt.

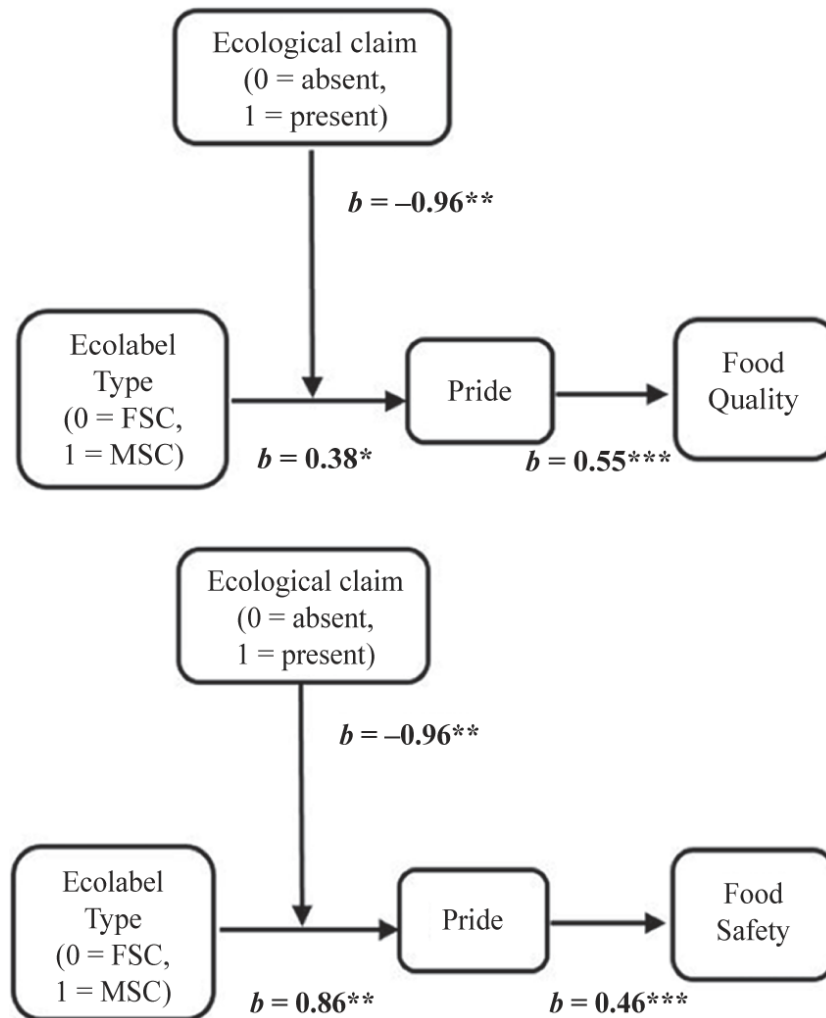


Figure 2 - Experimental study results (H3)

We can thus confirm our conceptualization. Where there was no ecological claim, only eco-labels coherent with the promoted product (i.e. the food-related MSC label), and therefore fitting the food product, generated a higher food evaluation (in terms of perceived quality and safety) owing to higher feelings of pride, thus following a peripheral route. Where there was an ecological claim, both eco-label types (i.e. the packaging-related FSC and food-related MSC labels) increased food perceptions

in terms of perceived quality and safety because of higher feelings of pride, thus following a central route.

5. Discussion and conclusions

In a world in which everyone is more conscious and concerned about health and environmental issues, the adoption of eco-labels certifying green production processes becomes ever more relevant, especially in the food domain, as food production and consumption have a direct impact on consumers' well-being and on ecosystem safeguarding. Previous research has yielded contrasting results for the influence of food-related eco-labels on food perceptions (e.g. Sörqvist *et al.*, 2013, 2015; Vitale *et al.*, 2020; Van Doorn and Verhoef, 2011; Delmas and Lessem, 2017), and the role of packaging-related eco-labels on food perceptions has been neglected. The objective of the present research was to shed light on these particular issues; this study is, to the best of our knowledge, the first to compare food- vs packaging-related eco-labels in terms of food perceptions, demonstrating that food packages presenting food-related eco-labels (i.e. MSC) are perceived as having higher quality and safety.

Notably, both food-related and packaging-related eco-labels (i.e. MSC vs FSC) are equally able to affect food evaluations in terms of perceived quality and safety when there is also an ecological claim explaining the meaning of the eco-label. This result is particularly relevant for several reasons. First, it extends previous research on the ability of eco-labels to affect food evaluations (e.g. Sörqvist *et al.*, 2013, 2015), with a particular focus on perceived food quality and safety, thereby disconfirming the supposed eco-penalties associated with sustainable characteristics of a food product (Van Doorn and Verhoef, 2011; Delmas and Lessem, 2017). Second, our results implicitly confirm the general lack of knowledge about benefits associated with eco-labels (e.g. Uchida *et al.*, 2014; Calderon-Monge *et al.*, 2020), showing that despite the increasing interest in sustainability, consumers' awareness and understanding of eco-labels remain low (e.g. Grunert *et al.*, 2014; Thøgersen, 2000, 2002; Teisl *et al.*, 2008). In fact, according to the pretest results, only 50% of the respondents were familiar with

the MSC and FSC eco-labels, and fewer than 30% were able to recognize the product category. In such a context, the presence of written information on food packaging about the meaning of eco-labels is fundamental for the efficacy of those labels. In fact, according to our results, the presence of ecological claims makes both food- and packaging-related eco-labels equally effective in influencing consumers' food evaluations, thus confirming previous findings from the package sustainability literature (e.g. Magnier *et al.*, 2016; Donato *et al.*, 2021).

This study also identifies the feeling of pride, rather than of guilt, as a possible mechanism for the positive relationship between eco-labels and food evaluations, thus demonstrating the pivotal role of positive (vs negative) emotions in explaining sustainable consumption (e.g. Antonetti and Maklan, 2014a, b; Schneider *et al.*, 2017; Adıgüzel and Donato, 2021). In particular, when consumers are informed about the meaning of eco-labels (i.e. when an ecological claim is present), they are proud to buy a food product labeled with either a food- or a packaging-related eco-label, and this feeling of pride generates a high perception of food quality and safety. Conversely, if consumers are not informed about the meaning of eco-labels, only food-related eco-labels generate feelings of pride and higher perceptions of quality and safety. These findings are in line with those of Kim and Huang (2021) who demonstrated a positive relationship between pride and food evaluations, with the difference that in our research pride is triggered by sustainability cues on food packages, in the form of eco-labels and ecological claims.

Finally, it is essential to highlight the practical implications for businesses and policymakers. From a managerial perspective, we found that consumers trust both food-related and packaging-related eco-labels as signals of higher food quality and safety. Accordingly, we suggest that displaying eco-labels on food packages is a key driver of competitive advantage for food manufacturers, regardless of whether those labels are related to the food itself or to its packaging.

This result may also have important practical implications in terms of pricing policies, with consumers displaying higher willingness to pay for eco-labeled products, as safer and higher-quality food have been found to be extremely valuable to them.

This study also confirms the role played by pride in the choice of sustainable products. Retailers and food managers can use appeals to pride for the purpose of promoting eco-labeled foods; negative appeals (i.e. to guilt) are not effective. Thus, food manufacturers should design advertising campaigns aimed at promoting the positive consequences of sustainable foods and packaging. Moreover, these advertising campaigns are expected to be particularly effective for female consumers, since our results demonstrated that compared to males, females are more sensitive to food perceived safety.

However, we would advise retailer and food managers to add specific ecological claims to inform consumers about the meaning of the eco-label, especially for packaging-related eco-labels; providing more explanation of the sustainable benefits related to the label itself would increase the effectiveness of these tools. Our results also indicate that retailers can use private eco-labels to increase the perceived quality and security of their food products, advertising their presence not only on food packages but also on flyers and educating their customers about the benefits of eco-labeled food products. This strategy could enhance the retailer's image, giving a potential competitive advantage compared to other retailers.

From a public policy perspective, finding new ways to promote sustainable consumption and production is one of the key challenges facing policymakers. Our contribution is twofold. First, on the production side, policymakers can leverage our results to inform food manufacturers about the benefits of eco-labeling, prompting producers to adopt greener production methods both for the food itself and for its packaging, as well as investing in certification of those efforts through eco-labeling. Second, on the consumption side, our findings about the impact of eco-labels on perceptions of food quality and safety provide policymakers with an unobtrusive tool with which to promote the consumption of greener food.

Furthermore, given the low recognition rate for eco-labels confirmed in our studies, policymakers should also invest in awareness advertising campaigns aimed at conveying the meaning of eco-labels. Ecological claims can be a powerful instrument for encouraging the adoption of sustainable labels in consumers' decision-making processes, thus increasing demand for sustainable products.

5.1. Limitation and future research direction

Considering the environmental challenges that society is facing and the need to develop sales of sustainable products in the food domain, the relationship between eco-labels and food perceptions is a fertile topic for future research that builds on the present findings. First, our results focus on a particular food category, namely frozen cod fillets, mainly because this is a product often bought by our sample, made of undergraduate students. However, further studies should confirm our results for different food categories, such as fresh produce, and for different countries, including emerging countries in which eco-labels are not yet widely diffused, for example considering how the presence of claims affects eco-labeled wine, the product category for which eco-penalties appear to be more frequent (e.g. Delmas and Lessem, 2017). Moreover, as the use of a sample of students represent a main limitation of this work, we suggest that future studies should improve the external validity of our findings by verifying the impact of important variables that may influence the results, such as professional status, nationality income, age, food knowledge, also controlling for product buying frequencies. Third, the present study has focused on two specific eco-labels with a conceptually explicit design, namely the MSC and FSC logos. Future research should verify whether our results can be generalized to eco-labels with designs that are not conceptually explicit (i.e. eco-labels with a logo not immediately associable with sustainability). Furthermore, our prediction on H1a and H1b have not been fully supported, and this result is opposite to previous findings according to which sustainable packages are able to affect food evaluations (e.g., Steenis et al., 2017; Magnier et al., 2016). Consequently, the role of ecolabels and claims on perceived food quality and safety requires a deeper investigation and we encourage additional studies aimed at shedding lights on the efficacy of the presence vs. absence of sustainable certifications for FMCGs. Moreover, given that we focused on third-party certified labels (Type I- ISO 14024) which are always signaled through a logo, we did not check whether the absence (vs. presence) of the claim could affect the proposed relationship. Further studies could focus on Type II labels, which are self-declared environmental information, to check whether the differentiation between product-specific and package-specific declarations still holds in this

context. Fourth, the specific experimental stimulus used in this study, namely frozen fish, involves a high level of visual coherence between the product and the MSC eco-label logo. Future studies can verify whether these effects apply to other food-related eco-labels that do not present an explicitly food-related logo design (for instance, the Agriculture Biologique logo). Finally, our analysis did not include eco-labels that attest social sustainability, such as the Fairtrade eco-label. Future studies should consider the effects of these eco-labels on food evaluations, drawing comparisons between food- and packaging-related eco-labels.

References

- Abraben, L.A., Grogan, K.A. and Gao, Z. (2017), “*Organic price premium or penalty? A comparative market analysis of organic wines from Tuscany*”, *Food Policy*, Vol. 69, pp. 154-165.
- Adigüzel, F. and Donato, C. (2021), “*Proud to be sustainable: upcycled versus recycled luxury products*”, *Journal of Business Research*, Vol. 130, pp. 137-146.
- Amatulli, C., De Angelis, M., Peluso, A.M., Soscia, I. and Guido, G. (2019), “*The effect of negative message framing on green consumption: an investigation of the role of shame*”, *Journal of Business Ethics*, Vol. 157 No. 4, pp. 1111-1132.
- Antonetti, P. and Maklan, S. (2014a), “*Exploring postconsumption guilt and pride in the context of sustainability*”, *Psychology and Marketing*, Vol. 31 No. 9, pp. 717-735.
- Antonetti, P. and Maklan, S. (2014b), “*Feelings that make a difference: how guilt and pride convince consumers of the effectiveness of sustainable consumption choices*”, *Journal of Business Ethics*, Vol. 124 No. 1, pp. 117-134.
- Boesen, S., Bey, N. and Niero, M. (2019), “*Environmental sustainability of liquid food packaging: is there a gap between Danish consumers' perception and learnings from life cycle assessment?*”, *Journal of Cleaner Production*, Vol. 210, pp. 1193-1206.
- Bronnmann, J. and Asche, F. (2017), “*Sustainable seafood from aquaculture and wild fisheries: insights from a discrete choice experiment in Germany*”, *Ecological Economics*, Vol. 142, pp. 113-119.
- Calderon-Monge, E., Redondo-Rodriguez, R.G. and Ramírez-Hurtado, J.M. (2020), “*Narrowing the gap between consumer purchasing intention and behaviour through ecolabelling: a challenge for eco-entrepreneurism*”, *British Food Journal*, Vol. 123, pp. 1-13.
- Cerri, J., Testa, F. and Rizzi, F. (2018), “*The more I care, the less I will listen to you: how information, environmental concern and ethical production influence consumers' attitudes and the purchasing of sustainable products*”, *Journal of Cleaner Production*, Vol. 175, pp. 343-353.
- Chaiken, S. (1980), “*Heuristic versus systematic information processing and the use of source versus message cues in persuasion*”, *Journal of Personality and Social Psychology*, Vol. 39 No. 5, pp. 752-766.
- Delmas, M.A. and Lessem, N. (2017), “*Eco-premium or eco-penalty? Eco-labels and quality in the organic wine market*”, *Business and Society*, Vol. 56 No. 2, pp. 318-356.

- Donato, C., Barone, A.M. and Romani, S. (2021), “*The satiating power of sustainability: the effect of package sustainability on perceived satiation of healthy food*”, *British Food Journal*, Vol. 123 No. 13, pp. 162-177.
- Eldesouky, A., Mesias, F.J. and Escribano, M. (2020), “*Perception of Spanish consumers towards environmentally friendly labelling in food*”, *International Journal of Consumer Studies*, Vol. 44 No. 1, pp. 64-76.
- Grankvist, G. and Biel, A. (2001), “*The importance of beliefs and purchase criteria in the choice of eco-labeled food products*”, *Journal of Environmental Psychology*, Vol. 21 No. 4, pp. 405-410.
- Grunert, K.G. (2005), “*Food quality and safety: consumer perception and demand*”, *European Review of Agricultural Economics*, Vol. 32 No. 3, pp. 369-391.
- Grunert, K.G. (2011), “*Sustainability in the food sector: a consumer behaviour perspective*”, *International Journal on Food System Dynamics*, Vol. 2 No. 3, pp. 207-218.
- Grunert, K.G., Hieke, S. and Wills, J. (2014), “*Sustainability labels on food products: consumer motivation, understanding and use*”, *Food Policy*, Vol. 44, pp. 177-189.
- Hayes, A.F. (2017), “*Mediation, moderation, and conditional process analysis*”, *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, Guilford Publications, New York, pp. 1-20.
- Herbes, C., Beuthner, C. and Ramme, I. (2018), “*Consumer attitudes towards biobased packaging – a cross-cultural comparative study*”, *Journal of Cleaner Production*, Vol. 194, pp. 203-218.
- Hoek, A.C., Pearson, D., James, S.W., Lawrence, M.A. and Friel, S. (2017), “*Shrinking the food-print: a qualitative study into consumer perceptions, experiences and attitudes towards healthy and environmentally friendly food behaviours*”, *Appetite*, Vol. 108, pp. 117-131.
- Hoek, A.C., Malekpour, S., Raven, R., Court, E. and Byrne, E. (2021), “*Towards environmentally sustainable food systems: decision-making factors in sustainable food production and consumption*”, *Sustainable Production and Consumption*, Vol. 26, pp. 610-626.
- Horne, R.E. (2009), “*Limits to labels: the role of eco-labels in the assessment of product sustainability and routes to sustainable consumption*”, *International Journal of Consumer Studies*, Vol. 33 No. 2, pp. 175-182.
- Iraldo, F., Griesshammer, R. and Kahlenborn, W. (2020), “*The future of ecolabels*”, *The International Journal of Life and Cycle Assessment*, Vol. 25, pp. 833-839.

- Kim, S.H. and Huang, R. (2021), “*Understanding local food consumption from an ideological perspective: locavorism, authenticity, pride, and willingness to visit*”, *Journal of Retailing and Consumer Services*, Vol. 58, p. 102330.
- Lee, W.C.J., Shimizu, M., Kniffin, K.M. and Wansink, B. (2013), “*You taste what you see: do organic labels bias taste perceptions?*”, *Food Quality and Preference*, Vol. 29 No. 1, pp. 33-39.
- Lestari, E.R., Hanifa, K.P.U. and Hartawan, S. (2020), “*Antecedents of attitude toward green products and its impact on purchase intention*”, *IOP Conference Series: Earth and Environmental Science*, IOP Publishing, Vol. 515 No. 1, p. 012073.
- Lewis, M. (1995), “*Self-conscious emotions*”, *American Scientist*, Vol. 83 No. 1, pp. 68-78.
- Lim, K.H. and Reed, M. (2020), “*Do ecolabels cheapen wines?*”, *Journal of Cleaner Production*, Vol. 245, p. 118696.
- Lindenmeier, J., Lwin, M., Andersch, H., Phau, I. and Seemann, A.K. (2017), “*Anticipated consumer guilt: an investigation into its antecedents and consequences for fair-trade consumption*”, *Journal of Macromarketing*, Vol. 37 No. 4, pp. 444-459.
- Liu, C., Zheng, Y. and Cao, D. (2021), “*An analysis of factors affecting selection of organic food: perception of consumers in China regarding weak signals*”, *Appetite*, Vol. 161, p. 105145.
- Luchs, M.G. and Mooradian, T.A. (2012), “*Sex, personality, and sustainable consumer behaviour: elucidating the gender effect*”, *Journal of Consumer Policy*, Vol. 35 No. 1, pp. 127-144.
- Luchs, M.G., Phipps, M. and Hill, T. (2015), “*Exploring consumer responsibility for sustainable consumption*”, *Journal of Marketing Management*, Vol. 31 Nos 13-14, pp. 1449-1471.
- Magnier, L. and Schoormans, J. (2017), “*How do packaging material, colour and environmental claim influence package, brand and product evaluations?*”, *Packaging Technology and Science*, Vol. 30 No. 11, pp. 735-751.
- Magnier, L., Schoormans, J. and Mugge, R. (2016), “*Judging a product by its cover: packaging sustainability and perceptions of quality in food products*”, *Food Quality and Preference*, Vol. 53, pp. 132-142.
- Marchini, A., Riganelli, C., Diotallevi, F. and Polenzani, B. (2021), “*Label information and consumer behaviour: evidence on drinking milk sector*”, *Agricultural and Food Economics*, Vol. 9 No. 1, pp. 1-24.

- Marozzo, V., Raimondo, M.A., Miceli, G.N. and Scopelliti, I. (2020), “*Effects of au naturel packaging colors on willingness to pay for healthy food*”, *Psychology and Marketing*, Vol. 37 No. 7, pp. 913-927.
- Miranda-Ackerman, M.A. and Azzaro-Pantel, C. (2017), “*Extending the scope of eco-labelling in the food industry to drive change beyond sustainable agriculture practices*”, *Journal of Environmental Management*, Vol. 204, pp. 814-824.
- Notarnicola, B., Tassielli, G., Renzulli, P.A., Castellani, V. and Sala, S. (2017), “*Environmental impacts of food consumption in Europe*”, *Journal of Cleaner Production*, Vol. 140, pp. 753-765.
- Onwezen, M.C., Antonides, G. and Bartels, J. (2013), “*The Norm Activation Model: an exploration of the functions of anticipated pride and guilt in pro-environmental behaviour*”, *Journal of Economic Psychology*, Vol. 39, pp. 141-153.
- Onwezen, M.C., Bartels, J. and Antonides, G. (2014a), “*Environmentally friendly consumer choices: cultural differences in the self-regulatory function of anticipated pride and guilt*”, *Journal of Environmental Psychology*, Vol. 40, pp. 239-248.
- Onwezen, M.C., Bartels, J. and Antonides, G. (2014b), “*The self-regulatory function of anticipated pride and guilt in a sustainable and healthy consumption context*”, *European Journal of Social Psychology*, Vol. 44 No. 1, pp. 53-68.
- O'Brien, K.A. and Teisl, M.F. (2004), “*Eco-information and its effect on consumer values for environmentally certified forest products*”, *Journal of Forest Economics*, Vol. 10 No. 2, pp. 75-96.
- Panico, T., Pagnani, T. and Caracciolo, F. (2018), “*Intention to purchase sustainable wood products: an empirical analysis of the determinants*”, *International Journal on Food System Dynamics*, Vol. 9 No. 4, pp. 342-353.
- Patrick, V.M., Chun, H.H. and MacInnis, D.J. (2009), “*Affective forecasting and self-control: why anticipating pride wins over anticipating shame in a self-regulation context*”, *Journal of Consumer Psychology*, Vol. 19 No. 3, pp. 537-545.
- Pelozo, J., White, K. and Shang, J. (2013), “*Good and guilt-free: the role of self-accountability in influencing preferences for products with ethical attributes*”, *Journal of Marketing*, Vol. 77 No. 1, pp. 104-119.
- Petty, R.E. and Cacioppo, J.T. (1981), *Attitudes and Persuasion: Classic and Contemporary Approaches*, Wm. C. Brown, Dubuque, IA.

- Philippot, P. and Feldman, R.S. (2004), “*Positive emotion and the regulation of interpersonal relationships*”, in *The Regulation of Emotion*, Taylor & Francis e-Library, Mahawah, NJ, pp. 142-171.
- Popovic, I., Bossink, B.A. and van der Sijde, P.C. (2019), “*Factors influencing consumers' decision to purchase food in environmentally friendly packaging: what do we know and where do we go from here?*”, *Sustainability*, Vol. 11 No. 24, pp. 71-97.
- Potter, C., Bastounis, A., Hartmann-Boyce, J., Stewart, C., Frie, K., Tudor, K., Bianchi, F., Cartwright, E., Cook, B., Rayner, M. and Jebb, S.A. (2021), “*The effects of environmental sustainability labels on selection, purchase, and consumption of food and drink products: a systematic review*”, *Environment and Behavior*, pp. 1-35.
- Prieto-Sandoval, V., Alfaro, J.A., Mejía-Villa, A. and Ormazabal, M. (2016), “*ECO-labels as a multidimensional research topic: trends and opportunities*”, *Journal of Cleaner Production*, Vol. 135, pp. 806-818.
- Rebollar, R., Gil, I., Lidón, I., Martín, J., Fernández, M.J. and Rivera, S. (2017), “*How material, visual and verbal cues on packaging influence consumer expectations and willingness to buy: the case of crisps (potato chips) in Spain*”, *Food Research International*, Vol. 99, pp. 239-246.
- Risius, A., Janssen, M. and Hamm, U. (2017), “*Consumer preferences for sustainable aquaculture products: evidence from in-depth interviews, think aloud protocols and choice experiments*”, *Appetite*, Vol. 113, pp. 246-254.
- Rokka, J. and Uusitalo, L. (2008), “*Preference for green packaging in consumer product choices – do consumers care?*”, *International Journal of Consumer Studies*, Vol. 32 No. 5, pp. 516-525.
- Sala, S., McLaren, S.J., Notarnicola, B., Saouter, E. and Sonesson, U. (2017), “*In quest of reducing the environmental impacts of food production and consumption*”, *Journal of Cleaner Production*, Vol. 140, pp. 387-398.
- Schneider, C.R., Zaval, L., Weber, E.U. and Markowitz, E.M. (2017), “*The influence of anticipated pride and guilt on pro-environmental decision making*”, *PloS One*, Vol. 12 No. 11, p. e0188781.
- Sen, S. and Bhattacharya, C.B. (2001), “*Does doing good always lead to doing better? Consumer reactions to corporate social responsibility*”, *Journal of Marketing Research*, Vol. 38 No. 2, pp. 225-243.

- Seo, S. and Yun, N. (2015), “*Multi-dimensional scale to measure destination food image: case of Korean food*”, *British Food Journal*, Vol. 117 No. 12, pp. 2914-2929.
- Sörqvist, P., Hedblom, D., Holmgren, M., Haga, A., Langeborg, L., Nörtl, A. and Kågström, J. (2013), “*Who needs cream and sugar when there is eco-labeling? Taste and willingness to pay for ‘eco-friendly’ coffee*”, *PLoS ONE*, Vol. 8 No. 12, e80719.
- Sörqvist, P., Haga, A., Langeborg, L., Holmgren, M., Wallinder, M., Nörtl, A., Seager, P.B. and Marsh, J.E. (2015), “*The green halo: mechanisms and limits of the eco-label effect*”, *Food Quality and Preference*, Vol. 43, pp. 1-9.
- Steenis, N.D., van Herpen, E., van der Lans, I.A., Ligthart, T.N. and van Trijp, H.C. (2017), “*Consumer response to packaging design: the role of packaging materials and graphics in sustainability perceptions and product evaluations*”, *Journal of Cleaner Production*, Vol. 162, pp. 286-298.
- Teisl, M.F., Rubin, J. and Noblet, C.L. (2008), “*Non-dirty dancing? Interactions between eco-labels and consumers*”, *Journal of Economic Psychology*, Vol. 29 No. 2, pp. 140-159.
- Testa, F., Iraldo, F., Vaccari, A. and Ferrari, E. (2015), “*Why eco-labels can be effective marketing tools: evidence from a study on Italian consumers*”, *Business Strategy and the Environment*, Vol. 24 No. 4, pp. 252-265.
- Thøgersen, J. (2000), “*Psychological determinants of paying attention to eco-labels in purchase decisions: model development and multinational validation*”, *Journal of Consumer Policy*, Vol. 23 No. 3, pp. 285-313.
- Thøgersen, J. (2002), “*Promoting green consumer behavior with eco-labels*”, *New Tools for Environmental Protection*, pp. 83-104.
- Thøgersen, J., Haugaard, P. and Olesen, A. (2010), “*Consumer responses to ecolabels*”, *European Journal of Marketing*, Vol. 44 Nos 11/12, pp. 1787-1810.
- Trudel, R. (2019), “*Sustainable consumer behavior*”, *Consumer Psychology Review*, Vol. 2 No. 1, pp. 85-96.
- Uchida, H., Onozaka, Y., Morita, T. and Managi, S. (2014), “*Demand for ecolabeled seafood in the Japanese market: a conjoint analysis of the impact of information and interaction with other labels*”, *Food Policy*, Vol. 44, pp. 68-76.
- Van Amstel, M., Driessen, P. and Glasbergen, P. (2008), “*Eco-labeling and information asymmetry: a comparison of five eco-labels in The Netherlands*”, *Journal of Cleaner Production*, Vol. 16 No. 3, pp. 263-276.

- Van Doorn, J. and Verhoef, P.C. (2011), “*Willingness to pay for organic products: differences between virtue and vice foods*”, *International Journal of Research in Marketing*, Vol. 28 No. 3, pp. 167-180.
- Vitale, S., Biondo, F., Giosuè, C., Bono, G., Okpala, C.O.R., Piazza, I. and Pipitone, V. (2020), “*Consumers' perception and willingness to pay for eco-labeled seafood in Italian hypermarkets*”, *Sustainability*, Vol. 12 No. 4, p. 1434.
- Wagner, M. (2008), “*Empirical influence of environmental management on innovation: evidence from Europe*”, *Ecological Economics*, Vol. 66 Nos 2-3, pp. 392-402.
- White, K., Lin, L., Dahl, D.W. and Ritchie, R.J. (2016), “*When do consumers avoid imperfections? Superficial packaging damage as a contamination cue*”, *Journal of Marketing Research*, Vol. 53 No. 1, pp. 110-123.
- Wiedmann, K.P., Hennigs, N., Behrens, S.H. and Klarmann, C. (2014), “*Tasting green: an experimental design for investigating consumer perception of organic wine*”, *British Food Journal*, Vol. 116 No. 2, pp. 197-211.

Appendix 1

Figure A1 – Ecolabels used in the pretest



Appendix 2

Figure A2 – Stimuli used in the experimental study

