

Selling Suboptimal Food: A Systematic Literature Review of Marketing Actions and Outcomes from a Retailer-Centered Perspective

Linda Breimhorst¹

¹Paderborn University, Warburger Str. 100, 33098 Paderborn, Germany

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Correspondence to:

Linda Breimhorst
Email: linda.breimhorst@uni-paderborn.de

Keywords

Food waste, suboptimal food, retail marketing, point of sale, literature review

Abstract

Suboptimal food – edible products deviating from standard norms in appearance, date labeling, or packaging – is often rejected by consumers, contributing to food waste at the point of sale. Retailers can play a decisive role in mitigating this waste by actively selling and marketing suboptimal food. However, retailers face a lack of systematic knowledge on the various marketing actions they can implement and their contextual effectiveness. This paper presents a systematic literature review that adopts a retailer-centered perspective and synthesizes research on consumer perceptions and retail outcomes of selling suboptimal food, the effectiveness of retail marketing actions, and the role of contextual influences. Building on this synthesis, the paper provides actionable insights for retailers and identifies promising avenues for future research.

1. Introduction

Food waste – disposal of food by retailers or consumers (FAO 2019) – is a significant global issue, with up to 1.05 billion tons wasted annually (United Nations Environment Programme 2024). This waste has ecological consequences, including emissions and methane release (Bernstad Saraiva Schott and Anderson 2015; Garnett 2011), as well as economic consequences for the food industry, such as financial losses or damage to reputational image (Aschemann-Witzel et al. 2020a; Theotokis et al. 2012).

Research identifies suboptimal food as key driver of food waste at the point of sale (Aschemann-Witzel et al. 2015; De Hooze et al. 2017). Suboptimal food is defined as food which differs from optimal standards (Aschemann-Witzel et al. 2015; Aschemann-Witzel et al. 2017a) in appearance (e. g., shape, size, or color, e. g., Loebnitz and Grunert 2015), date labeling (e. g., close to or past the expiration date, Chung et al. 2025), or packaging (e. g., a dented can, White et al. 2016). Although it is usually edible and safe (Aschemann-Witzel et al. 2015; Aschemann-Witzel et al. 2018; De Hooze et al. 2017), consumers often perceive it as less healthy, less tasty, and riskier (Castagna et al. 2021; Pfeiffer et al. 2021), which reduces purchase intentions (Cooremans and Geuens 2019) and thus contributes to food waste at the point of sale.

Retailers can play a pivotal role in preventing food waste by selling and marketing suboptimal food. Prior research shows that retailers' marketing actions for suboptimal food can mitigate negative effects on consumer decision making (e. g., Aschemann-Witzel et al. 2019; Grewal et al. 2019), thereby promoting more sustainable consumer behavior at the point of sale (e. g., Mookerjee et al. 2021; van Giesen and De Hooze 2019). Yet, while selling suboptimal food can help retailers reduce food waste, it simultaneously poses the risk of negative outcomes for retailers. For example, prior research reveals that consumers may transfer negative perceptions of suboptimal food to the

retailer. As, selling and marketing suboptimal food may affect consumers' perceptions of retailers' competence (Pfeiffer et al. 2021) and image (Theotokis et al. 2012), with negative effects for the customer-retailer relationship (Tang et al. 2022). Thus, it remains unclear under which conditions retailers benefit from selling suboptimal food. However, understanding these conditions is important to encourage retailers to enhance their efforts to reduce food waste.

Existing research already provides important insights into the consequences of selling suboptimal food. However, these insights are mainly fragmented across consumer, sustainability, and marketing perspectives, without being systematically organized from a retailer-centered perspective. Existing reviews have made important contributions but remain limited in this regard. For example, Hartmann et al. (2021) primarily focus on consumer-related barriers and acceptance of suboptimal food, while Varese et al. (2023) adopt a broader sustainability-oriented perspective on strategies to reduce food waste in general. To address this gap, this paper conducts a systematic literature review that adopts a retailer-centered approach, emphasizing consequences of selling suboptimal food for retailers, providing an overview of different retail marketing actions for suboptimal food, and understanding the role of situational and consumer characteristics in selling suboptimal food.

This review advances retail and service research in several ways. First, it provides a systematic literature review from a retailer-centered perspective, integrating evidence from consumer, sustainability, and marketing literature. In doing so, it highlights the trade-offs retailers face when marketing suboptimal food. Second, it emphasizes the interplay between retailers' marketing actions and contextual conditions, showing how situational and consumer characteristics shape outcomes of suboptimal food in retail settings. Third, it derives a structured research agenda outlining key avenues for future research on retail marketing for suboptimal food. Fourth, the review identifies opportunities to view subopti-

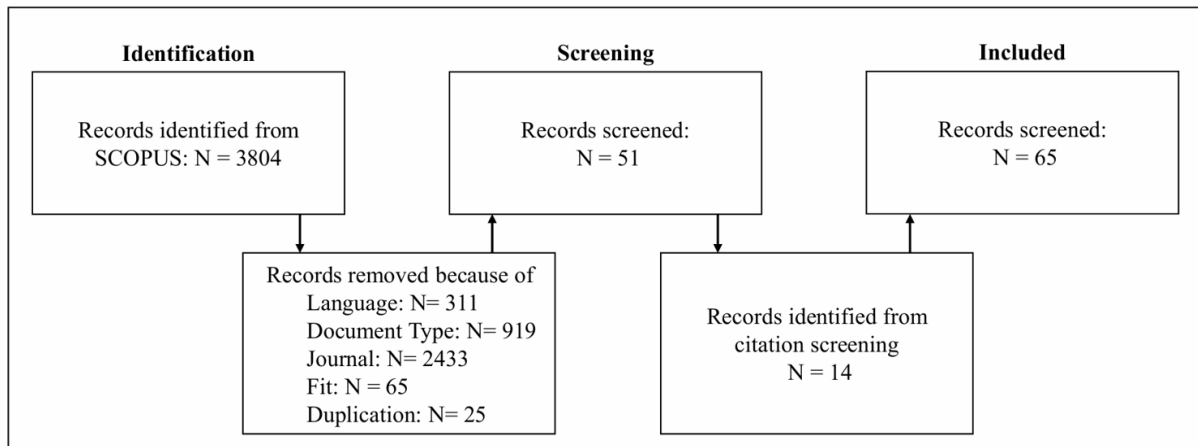


Fig. 1 Data collection process

mal food marketing from a service perspective, where complementary in-store services can enhance consumers' perceived value of suboptimal food and its outcomes.

The paper is structured as follows: First, the methodology of the systematic literature review is explained, followed by a descriptive analysis of the selected studies. Next, an integrative analysis of the findings is presented. Finally, future research approaches and potential research questions as well as practical implications for retailers are derived.

2. Methodology of the Systematic Literature Review

To examine the effects of suboptimal food on consumers' perceptions and outcomes at the retail level, and the role of retailers' marketing actions as well situational and consumer characteristics in shaping these effects, a systematic literature review was conducted following the approach of Tranfield et al. (2003). Systematic literature reviews are a rigorous methodology for identifying, evaluating, and interpreting research in a transparent and structured manner (Hulland and Houston 2020; Palmatier et al. 2018; Tranfield et al. 2003). The review process involves three main steps: identification, screening and inclusion, and synthesis of

relevant articles. *Figure 1* illustrates the data collection process.

For the identification of relevant articles, the SCOPUS database was used. The search was conducted using the keywords “Ugly Food”, “Suboptimal Food”, “Imperfect Food”, “Unattractive Food” and “Expiration Date” in article titles, abstracts, and keywords, without time restrictions, resulting in 3804 initial records.

Several inclusion and exclusion criteria were used to guide the screening process (*Tab. 1*). First, articles were screened with regard to the study type. Only English-language, peer-reviewed empirical articles employing qualitative, quantitative or mixed-methods research designs were considered. Conceptual or practitioner articles, books, book chapters, dissertations, and conference proceedings were excluded. In addition, only journals ranked „A+“, „A“ or „B“ in the ranking of the German Academic Association for Business Research (VHB) were included. Second, the study context was considered when screening articles. The review focused on the retail stage of the food supply chain (e. g., supermarkets, grocery stores, farmers' markets). Third, in terms of suboptimal food type, articles were included if they examined suboptimal food as defined in this review (i. e., suboptimal due to appearance, date labeling or packing damage). Finally, only articles addressing retailer-controlled marketing actions (e. g., pricing, promotion and product presentation) were included, while articles

focusing on political or regulatory actions were excluded.

Titles and abstracts were first screened for eligibility, followed by full-text screening. After removing duplications and ineligible articles, 51 articles remained. A subsequent citation search identified 14 additional articles, resulting in a final sample of 65 articles.

To synthesize the findings, the customer experience model adapted from Verhoef et al. (2009) and Grewal et al. (2009) served as the theoretical foundation (*Figure 2*). Originating from the retail and service literature, this framework explains the creation of the retail customer experience. According to the model, consumer perceptions mediate the effects of retailer-controlled factors on retailer-relevant outcomes.

For the purpose of this review, the framework is transferred to the context of selling suboptimal food, which represents a specific aspect of the retail customer experience. The framework is particularly suitable because research on suboptimal food is highly fragmented across disciplines and explanatory perspectives. By integrating retailers' marketing actions, contextual influences, consumer perceptions, and retail outcomes, the framework provides a structured and retailer-centered approach examining what retailers can do to effectively pro-

mote suboptimal food. In this context, retailer-controlled factors refer to retailers' marketing actions for suboptimal food, while retailer-uncontrolled factors include consumer and situational characteristics. Following this approach, the reviewed literature is organized into three main topics:

- Topic A: Consequences of selling suboptimal food on consumer perceptions and retail outcomes
- Topic B: Effectiveness of retailers' marketing actions for suboptimal food
- Topic C: Situational and consumer characteristics shaping the effectiveness of retailers' marketing actions

3. Findings from the Systematic Literature Review

The following section presents the **results**. First, a descriptive analysis of the reviewed articles is provided, followed by an integrative synthesis of prior research findings along the identified research topics.

Tab. 1 Inclusion and exclusion criteria

Criterion	Included	Excluded
Study Type	• Peer-reviewed; VHB-Ranking at least B • Published • Empirical study, employing a qualitative, quantitative or mixed-methods design	• Not peer-reviewed; VHB-Ranking lower than B • Not published • Conceptual articles, practitioner articles, books, book chapters, dissertations, conference proceedings
Study Context	• Food supply chain: retail • Retail: Supermarkets, grocery stores, farmers' markets	• Food supply chain: production, processing, distribution, consumption
Suboptimal Food Type	• Suboptimal food sold at the retail level (e. g., suboptimality due to appearance, date labeling or packaging damage)	• Food loss and waste in production, processing, distribution or consumption
Marketing Relevance	• Retailer-controlled marketing actions to promote suboptimal food (e. g., price, promotion, presentation)	• Political or regulatory actions (e. g., food policy interventions, public awareness campaigns)

3.1. Descriptive Analysis of Selected Articles

The literature shows a growing academic interest in suboptimal food, with an annual growth rate of 8.38%, from 2005 to 2025. Most articles (62%) were published between 2020 and 2025 (*Figure 3*), highlighting the increasing relevance of the topic.

Most articles are published in food- or retailing-focused journals, with numerous articles in the journals “Food Quality and Preferences”, “British Food Journal” and “Journal of Retailing and Consumer Services” (*Tab. 2*).

In terms of methodology (*Tab. 3*), quantitative approaches dominate, especially surveys and laboratory experiments.

Regarding the type of suboptimality (*App. A*), most articles (76%) focus on appearance-related suboptimality, such as deviations in shape, size or color. Suboptimality related to expiration dates is addressed in 37% of articles, whereas damaged packaging is considered in only 17% of the articles.

3.2. Integrative Analysis

This section summarizes the findings of the systematic analysis. Results are organized according to three main topics: (A) consequences of selling suboptimal food on consumer perceptions and retail outcomes, (B) effectiveness of retailers’ marketing actions for suboptimal food, and (C) situational and consumer characteristics shaping the effectiveness of retailers’ marketing actions. *Figure 4* provides an overview of the findings, offering a comprehensive summary of existing knowledge on selling suboptimal food in retail. The full list of articles included in the analysis is shown in *App. A*.

3.2.1 Consequences of Selling Suboptimal Food on Consumer Perceptions and Retail Outcomes

Consumer Perceptions of Selling Suboptimal Food

The reviewed articles indicate that selling suboptimal food shapes consumer responses in

ways that are highly relevant for retailers, particularly through effects on (1) product perceptions, (2) interpersonal perceptions, and (3) retailer perceptions. Most articles focus on consumers’ product perceptions, while fewer examine interpersonal or retailer perceptions.

Tab. 2 Publications per journal

Name of Journal	Number of Studies
Food Quality and Preferences	19
British Food Journal	12
Journal of Retailing and Consumer Services	9
Psychology & Marketing	5
Appetite	3
Journal of Marketing	3
Journal of Business Research	2
Journal of Cleaner Production	2
Journal of Consumer Behaviour	2
Journal of Business Ethics	1
Journal of Marketing Research	1
Journal of Public Policy & Marketing	1
Journal of Retailing	1
Journal of the Academy of Marketing Science	1
Marketing Science	1
Resources Conservation and Recycling	1
Journal of the Association for Consumer Research	1

Tab. 3 Type of research

Type of Research	Number of Studies
Quantitative Research	103
Surveys	99
Laboratory experiments	11
Field experiments	2
Secondary data	
Qualitative Research	3
In-depth interviews	2
Focus group discussions	

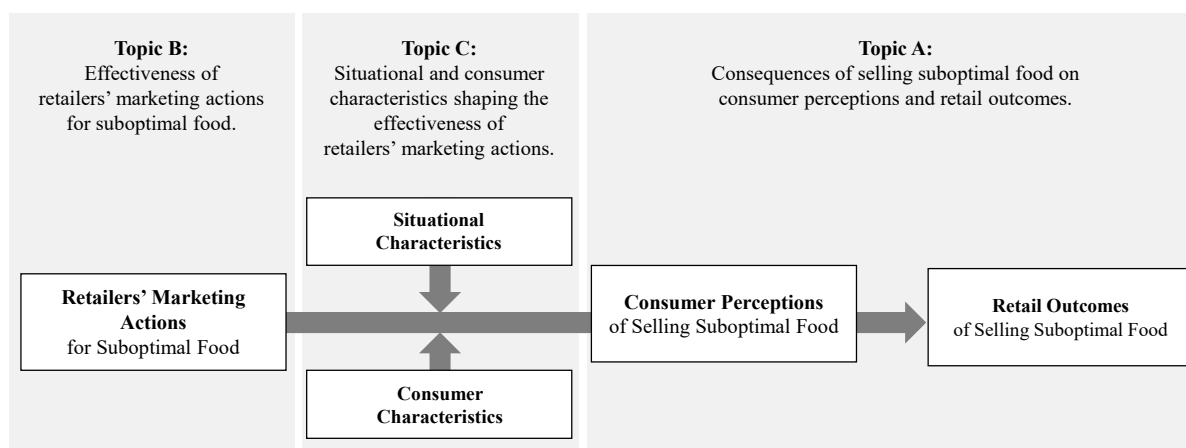


Fig. 2 Conceptual framework

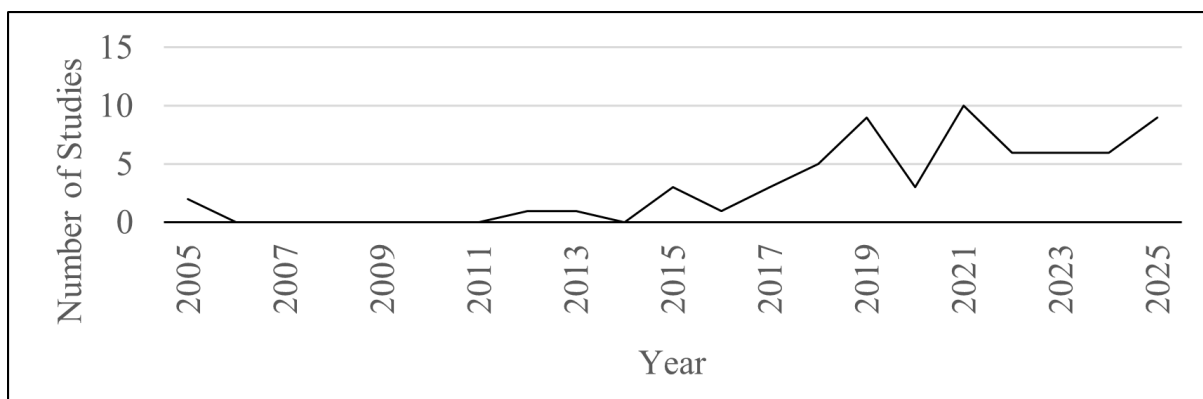


Fig. 3 Annual number of publications

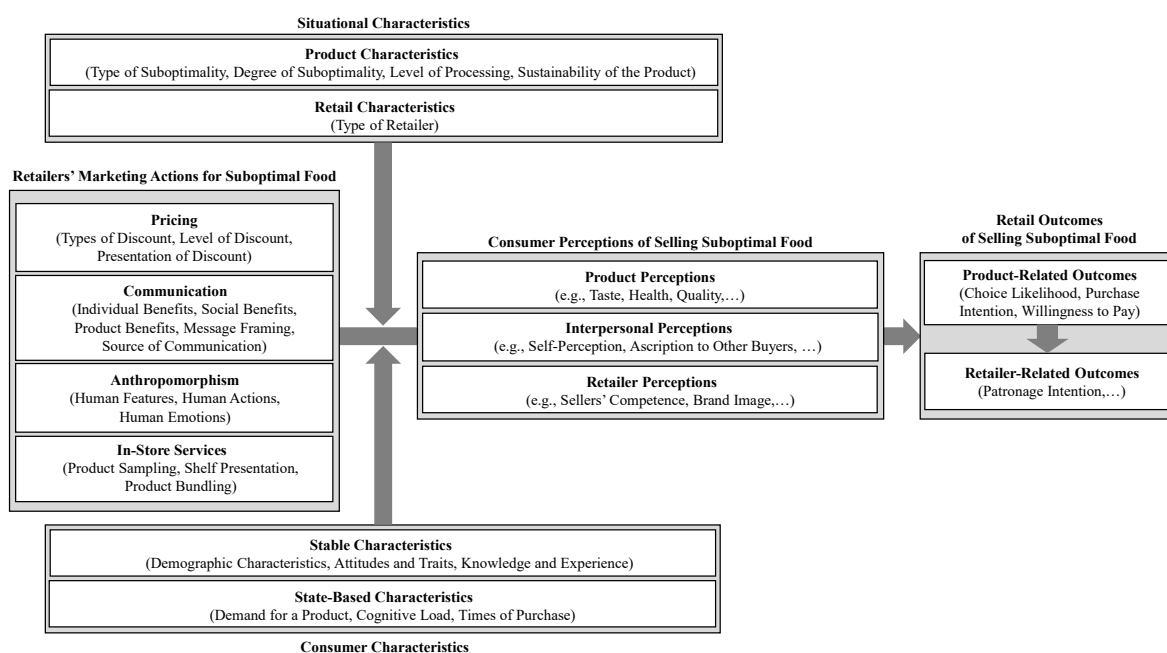


Fig. 4 Overview of research findings on selling suboptimal food in retail

Suboptimality generally leads to less favorable product perceptions (Lombart et al. 2019; Spielmann et al. 2023). Reasons for this include less positive affective reactions (Cooremans and Geuens 2019; Spielmann et al. 2023) and negative inferences about product taste, health and quality (Cooremans and Geuens 2019; Pai et al. 2024; Pfeiffer et al. 2021). Compared to optimal food, suboptimal food is perceived less tasty (Cooremans and Geuens 2019; Pfeiffer et al. 2021), less healthy (Pfeiffer et al. 2021), riskier (Castagna et al. 2021; Loebnitz and Grunert 2015) and of lower quality (Lombart et al. 2019; Pfeiffer et al. 2021).

Some articles show that suboptimality also influences interpersonal perceptions. Consumers may experience more negative self-perceptions when imaging consumption of suboptimal food (Grewal et al. 2019). At the same time, consumers also form judgments about other buyers: individuals who purchase suboptimal food are frequently attributed positive traits such as environmental responsibility (Aschemann-Witzel et al. 2020b).

Evidence on retailer perceptions is limited and mixed. Several articles report negative effects, such as lower perceived competence when retailers sell suboptimal food (Aschemann-Witzel et al. 2020a; Pfeiffer et al. 2021). Other findings suggest positive effects when suboptimality signals human care in production or when the food is perceived as tasty (Pfeiffer et al. 2021; Suher et al. 2021).

Retail Outcomes of Selling Suboptimal Food

Driven by these perceptions, selling suboptimal food also influences downstream consequences relevant to retailers, such as (1) product-related outcomes and (2) retailer-related outcomes. The reviewed articles mainly examine product-related outcomes. Overall, suboptimality tends to reduce choice likelihood and purchase intention (Cooremans and Geuens 2019; Grewal et al. 2019; Pai et al. 2024). Findings on willingness to pay are less consistent. Some articles report no significant effect of appearance on willingness to pay (Pai et al. 2024), while other show lower willingness to

pay for suboptimal food (Grewal et al. 2019; Tarabashkina et al. 2025). Retailer-related outcomes of selling suboptimal food have been less frequently investigated. However, the findings from Tang et al. (2022) indicate that in the context of suboptimal food, consumers' perception of retailers' concern for consumers is particularly relevant, thus when consumers perceive that retailers show little concern, their patronage intention may decrease.

3.2.2 Effectiveness of Retailers' Marketing Actions for Suboptimal Food

Several studies have examined how retailers can promote suboptimal food. In particular, research has investigated the role of different types of retail marketing actions, including (1) pricing, (2) communication, (3) anthropomorphism and (4) in-store services, with a strong focus on pricing and communication.

Pricing

Research has examined different types of discount for suboptimal food, such as expiration date-based pricing, where "[...] a retailer charges different prices for the same perishable products, according to their respective expiration dates" (Theotokis et al. 2012, p. 72), and multi-item promotion, where retailers "[...] offer a product for free when buying one or multiple similar products [...]" (De Hooze 2025, p. 2). In general, articles show that consumers are more likely to purchase suboptimal food when it is offered at a discounted price (Aschemann-Witzel 2018; De Hooze et al. 2017; Yuan et al. 2019). While the effectiveness of discounts is undisputed, findings on the optimal level of discount are mixed. Some articles show that high discounts (i. e., 50%) enhance perceived value and purchase intention (e. g., Chang and Su 2022), while others find no benefits of high discounts (e. g., van Giesen and De Hooze 2019). Evidence suggests that extensive discounts are often unnecessary when combined with effective communication (Mookerjee et al. 2021; van Giesen and De Hooze 2019). Moreover, research highlights the role of the presentation of discount (e. g., color, presentation format).

For example, Helmert et al. (2017) point out that the color of the price tag can influence the effectiveness of price discounts for suboptimal food, with red price tags attracting more attention than green ones. Moreover, Chang et al. (2024) demonstrate that the effectiveness of discounts depends on the presentation format (i. e., absolute vs. percentage). Hence, suboptimal food with a high original price is perceived more positive when the price discount is presented in absolute amounts rather than in percent (Chang et al. 2024).

Communication

Many articles investigate communication strategies that reduce reliance on price discounts. Research primarily examines messages emphasizing individual, social or product benefits of suboptimal food. Individual benefits can be financial or psychological. Financial benefit messages (e. g., “Reduced Item” or “Low price, save more!”; Aschemann-Witzel et al. 2019, p. 4) show mixed results: some articles report positive effects on perceived quality and choice likelihood (Aschemann-Witzel et al. 2019; Helmert et al. 2017), while others find no significant impact (Aschemann-Witzel et al. 2018; Aschemann-Witzel 2018). In contrast, messages emphasizing psychological benefits (i. e., “You are Fantastic! Pick Ugly Produce!”, p.99) seem to increase purchase intentions (Grewal et al. 2019).

Messages highlighting social benefits (e. g., “Don’t make me go to food waste!”; Aschemann-Witzel et al. 2019, p. 4) positively affect product perceptions (Aschemann-Witzel et al. 2019), consumers’ choice likelihood and purchase intention (Aschemann-Witzel et al. 2018; van Giesen and De Hooze 2019).

Product-benefit messages highlight positive attributes or address perceptual biases. Research shows that a general indication of suboptimality (e. g., “ugly potatoes”, Mookerjee et al. 2021; “Approaching the Expiration Date”, Tang et al. 2022) positively affects product and retailer perceptions as well as product-related (e. g., purchase decisions) and retailer-related outcomes (e. g., patronage intention) (Mookerjee

et al. 2021; Tang et al. 2022). Furthermore, research shows that messages which emphasize taste (e. g., Symmank et al. 2018), naturalness (e. g., van Giesen and De Hooze 2019) or origin (e. g., Tang et al. 2025) also enhance perceived quality, safety and purchase intention (Aschemann-Witzel et al. 2019; Hoang et al. 2025; Tang et al. 2025; van Giesen and De Hooze 2019). Moreover, Choi et al. (2022) show that communication focusing on hedonic benefits (e. g., taste) rather than utilitarian benefits (e. g., low calories) appears more effective.

Evidence further shows that message framing also affects consumer responses. Outcome-based framing (e. g., loss vs. gain) may influence product perceptions (Lagerkvist et al. 2023; Tang et al. 2025), although its effects depend on the respective aim: gain framing shows positive effects on the acceptance of suboptimal food, whereas loss framing strengthens psychological ownership (Lagerkvist et al. 2023; Tang et al. 2025). Finally, research shows that the source of communication matters: fact-based messages are more persuasive when delivered by an AI, whereas emotional-based messages work better through humans (Li et al. 2025).

Anthropomorphism

Anthropomorphism – defined as “[...] attributing humanlike properties, characteristics, or mental states to nonhuman agents and objects [...]” (Epley et al. 2007, p. 865) – is another marketing action that has been used to promote suboptimal food. Research shows that anthropomorphism is generally effective for marketing suboptimal food (Chen et al. 2021; Cooremans and Geuens 2019; Kim et al. 2024). Suboptimal food that is equipped with human features (e. g., irregular shaped eggplants with googly eyes, Kim et al. 2024, p. 2037), human names (e. g., Kim et al. 2024) or depicted in human actions (i. e., sunbathing bananas; Koo et al. 2019, p. 342) leads to more positive product evaluations, increased attractiveness and feelings of warmth, compared to non-anthropomorphized suboptimal food (Kim et al. 2024; Koo et al. 2019). Similarly, Chen et al. (2021)

show that the presentation of suboptimal food with human emotions, using human-toned expressions (i. e., “Buy us, please”; Chen et al. 2021, p. 3), has a positive effect on empathy.

In-Store Services

Three studies suggest that consumers’ perceived value of suboptimal products can be enhanced through in-store services provided by retailers. For example, Hoang et al. (2025) show that product sampling – allowing “[...] consumers to directly experience a product through their senses” – positively affects perceptions of safety and tastiness (Hoang et al. 2025, p. 6). Moreover, Hansen et al. (2024) find that shelf positioning also influences product choice, with consumers being more likely to select suboptimal food when it is displayed at the front of the shelf. Furthermore, Qi et al. (2022) demonstrate that product bundling can increase consumers’ willingness to pay for suboptimal food. Accordingly, consumers have a higher willingness to pay for suboptimal food when it is bundled with optimal food (Qi et al. 2022). Overall, these findings indicate that complementary in-store services can enhance the perceived value of suboptimal food, however, evidence on such in-store services remains limited.

3.2.3 Situational and Consumer Characteristics Shaping the Effectiveness of Retailers’ Marketing Actions

Research shows that situational and consumer characteristics shape the effectiveness of retailers’ marketing actions. Here, research has investigated (1) situational characteristics, including product and retail characteristics, and (2) consumer characteristics, including stable and state-based characteristics. While most research focuses on product characteristics and stable consumer characteristics, only a few articles examine retail characteristics and state-based consumer characteristics.

Situational Characteristics

The findings indicate that product characteristics significantly alter the outcomes of selling

suboptimal food, with effects varying by type and degree of suboptimality, processing level, and product sustainability. A central finding is that different types of suboptimality (i. e., appearance, date labeling, packaging damage) shape consumer responses. Generally, consumers react more positively to food with appearance-related suboptimality than to food close to the expiration date or with damaged packaging (Cao and Miao 2021; De Hooge et al. 2017). Appearance-related suboptimality is associated with higher quality, nutritional value and taste, whereas date-related suboptimality is perceived as riskier and linked to lower moral norms and higher financial losses (Cao and Miao 2021). The effectiveness of retail marketing also depends on the type of suboptimality (Aschemann-Witzel et al. 2017a; Aschemann-Witzel et al. 2018, 2020a). For example, price discounts generate more negative perceptions when applied to products close to the expiration date but are received more positively for products with suboptimal appearance or damaged packaging (Aschemann-Witzel et al. 2020a). Consumers also attribute different characteristics to buyers and retailers depending on the type of suboptimality, with damaged packaging leading to more negative interpersonal and retailer perceptions (Aschemann-Witzel et al. 2018, 2020a).

The degree of suboptimality (e. g., level of shape abnormality, level of damaging) likewise influences consumer responses. Consumers tend to prefer moderately misshapen products over slightly or heavily misshapen ones (Lombart et al. 2019). Similarly, less damaged packaging (i. e., crooked label) is preferred to superficial damage (i. e., ripped label) (White et al. 2016). For date-related suboptimality, the degree of suboptimality also effects consumers’ willingness to pay, with willingness to pay being higher for food with more days remaining to the expiry date (Tsiros and Heilman 2005). Processing level represents another relevant factor. Consumers are more likely to prefer optimal products when food is unprocessed, whereas preferences can shift towards suboptimal options when products are processed (Barone et al. 2021; Suher et al. 2021). One

explanation is that processed suboptimal food is perceived as reflecting greater human care than unprocessed suboptimal food (Suher et al. 2021). Willingness to pay for suboptimal food is also influenced by the processing level, as consumers are willing to pay more for suboptimal food (compared to optimal food) when the food is processed (Suher et al. 2021).

Product sustainability also influences consumers' reactions (Chang et al. 2024; Loebnitz et al. 2015; White et al. 2016). Organic or ethical labels can enhance positive perceptions and reactions to food which is suboptimal due to date or packaging damage (Chang et al. 2024; White et al. 2016). However, for food with extremely abnormal shapes, organic labels may reduce purchase intention compared to products without such labels (Loebnitz et al. 2015). While product characteristics represent a well-established stream, retail characteristics have received less attention. Nevertheless, the retailer type influences consumer reactions to suboptimal food. Suboptimal food offered at farmers' or organic markets generate more positive product and retailer perceptions than when offered in conventional grocery stores (Louis and Lombart 2018; Pfeiffer et al. 2021). Consistent with this, willingness to pay for food with a suboptimal appearance is higher at farmers' markets than in grocery stores (Qi et al. 2022).

Consumer Characteristics

Stable consumer characteristics are the most extensively examined characteristics and include demographics, attitudes and traits, as well as knowledge and experience.

The findings show that demographic characteristics such as gender, age, education and household composition affect responses to suboptimal food. Findings on gender are inconsistent, while some articles find no effects (Aschemann-Witzel 2018; De Hooge et al. 2017; Tarabashkina et al. 2025), others indicate higher acceptance among either men or women, depending on the type of suboptimality (Ammann et al. 2025; Symmank et al. 2018; Zhong 2025). Age seems to be a more stable

factor, as younger consumers generally show higher acceptance of suboptimal food (Aschemann-Witzel 2018; De Hooge et al. 2017). However, older consumers respond more favorably in specific contexts such as farmers' markets or when suboptimality concerns packaging (Ammann et al. 2025; Zhong 2025). Education also influences consumer responses (Aschemann-Witzel et al. 2017b; Aschemann-Witzel et al. 2018; Zhong 2025). Consumers with higher education tend to have higher expectations towards food and are therefore less likely to purchase food close to the expiration date or with damaged packaging (Zhong, 2025). Household composition is particularly relevant for willingness to pay for food close to the expiration date. Accordingly, expiration date has a smaller effect on willingness to pay in households with higher consumption rates than in those with lower consumption rates (Tsiros and Heilman 2005), whereas single households even tend to reject food close to the expiration date (Aschemann-Witzel et al. 2017b).

In addition to demographics, attitudes and traits also affect consumer reactions. Higher environmental orientation (Cooremans and Geuens 2019; Loebnitz and Grunert 2015; Xu et al. 2021), lower health orientation (Chen 2025; Zhong 2025) or lower risk perceptions of suboptimal food (Theotokis et al. 2012) are associated with more favorable responses. Social attitudes such as norms (Adel et al. 2022; Chen 2025), face consciousness (Adel et al. 2023) and egoistic or altruistic value orientations (Aschemann-Witzel et al. 2019; De Hooge et al. 2017), likewise shape consumers' reactions. Accordingly, norms encourage positive attitudes and purchase intention (Adel et al. 2022; Chen 2025), while face consciousness mitigates negative effects of suboptimality on purchase intention (Adel et al. 2023). Individuals with lower egoistic value orientations express higher purchase intention towards suboptimal food (De Hooge et al. 2017).

Knowledge and experience constitute another important stable consumer characteristic. Knowledge about food production (Loebnitz and Grunert 2018) and understanding of date labeling (Hall-Phillips and Shah 2017) influ-

ence consumers' risk perceptions of suboptimal food. Previous purchases of suboptimal food, familiarity with the product or awareness of food waste as an environmental problem have a positive effect on consumers' product perceptions and purchase intentions (Adel et al. 2022; Aydinli et al. 2023; Loebnitz et al. 2015; Tsalis 2020). Familiarity with marketing for suboptimal food also strengthens the positive effects of price discounts on product perceptions (Chang et al. 2024; Chang and Su 2022).

Research has also examined state-based consumer characteristics, including product demand, cognitive load, and time of purchase. Chen et al. (2021) demonstrate that consumers are more likely to purchase suboptimal food when they perceive it as popular. Cognitive load during purchase also influences reactions. Consumers under cognitive load tend to have more negative attitudes toward food with damaged packaging, regardless of the degree of suboptimality (White et al. 2016). In contrast, consumers who are not under cognitive load differentiate between degrees of suboptimality and respond negatively mainly to food with a high degree of suboptimality (White et al. 2016). Reactions also vary by purchase time (i. e., morning vs. evening), with consumers being less averse to purchase food close to the expiration date in the evening than in the morning (Chung et al. 2025).

4. Future Research Avenues

The systematic literature review provides a comprehensive overview of research on selling suboptimal food. It synthesizes key insights on consumer perceptions and retail outcomes of selling suboptimal food, retailers' marketing actions, as well as situational and consumer characteristics. Despite these contributions, the review also reveals several research gaps. The following section therefore outlines future research avenues and formulates exemplary

research questions that promise to advance the field (Tab. 4).

Avenue #1: Taking a closer look at the trade-off for retailers when selling suboptimal food

The review highlights the need to further investigate retailer-related outcomes. As initial findings indicate both negative spillover effects (e. g., Pfeiffer et al. 2021) and positive retailer evaluations (e. g., Louis and Lombart 2018; Tang et al. 2022) future research should investigate this trade-off and the underlying psychological mechanisms more. Research has also largely overlooked potential negative perceptions of retail marketing for suboptimal food. Consumers might have concerns about the motives and the fairness of retailers' efforts in marketing suboptimal products, resulting in feelings of skepticism, manipulative intent, or inequity. Studies should also examine how retailers can ensure positive perceptions and avoid negative outcomes. In particular, research could examine the effects of more proactive communication which increases transparency about retailers' costs and efforts or justifies why retailers promote suboptimal food.

Avenue #2: Analyzing the long-term outcomes of selling suboptimal food

The review shows that marketing suboptimal food affects various product-related outcomes such as choice likelihood (e. g., Aschemann-Witzel et al. 2018), purchase intention (e. g., Mookerjee et al. 2021) and willingness to pay (e. g., Qi et al. 2022). However, little is known about the effects on retailer-related outcomes. Only one study by Tang et al. (2022) indicates that marketing suboptimal food might also affect retailer-related outcomes. To better understand changes over time future research should try to use field data (e. g., scanner data). Prior research has mainly relied on survey data

and experiments and has almost exclusively used a single measurement point in time (with the exception of Bolos et al. 2022).

Avenue #3: Considering additional in-store services for suboptimal food

Prior studies on marketing suboptimal food have mainly focused on pricing and communication. Research calls for alternative marketing actions that complement these efforts and, unlike price discounts, do not generate direct financial losses for retailers (e. g., Spielmann et al. 2023). One promising but still underexplored perspective is to view the marketing of suboptimal food through a service lens. In this vein, future research should investigate how retailers can create additional value through accompanying services and retail service environments, as these shape consumer responses. For example, some retailers offer recipes including suboptimal products, to demonstrate usage ideas and increase consumer value. Retailers may also use communication to highlight such services and food waste reduction efforts. As consumers assess the legitimacy and trustworthiness of retailers' motives when marketing suboptimal food (Tang et al. 2022; Louis and Lombart 2018), future research should examine whether service interventions are more effective when accompanied by explanations of their purpose.

Avenue #4: Examining interactions between marketing actions for suboptimal food

Prior research indicates that marketing actions for suboptimal food may influence each other. For example, studies have identified interactions between pricing and communication. That is, lower price discounts are required when retailers combine pricing with an appropriate communication (e. g., Mookerjee et al. 2021; van Giesen and De Hooze 2019). Beyond price–communication interactions,

further interdependencies between marketing actions are conceivable. First, in-store services and communication may interact, such that in-store displays or visual cues might function as nonverbal quality and legitimacy signals, which in turn enhance the effectiveness of messages. Second, product presentation and pricing may jointly influence consumer perceptions, as the spatial arrangement of suboptimal and optimal food may affect reference price formation and comparative evaluations. Consequently, future research should adopt a more holistic perspective and examine both beneficial and detrimental interactions between different marketing actions for suboptimal food.

Avenue #5: Investigating the effects of selling suboptimal food in different sales channels

Only little research has been conducted on the influence of retail characteristics on the effectiveness of marketing suboptimal food. While prior research reveals major differences between supermarkets and farmers' markets (e. g., Ammann et al. 2025; Aschemann-Witzel et al. 2019), other types of retailers have not yet been examined. Due to major differences in price orientations and target consumers, a comparison between supermarkets and discounters would be worthwhile investigating. Moreover, given the growing share of online supermarkets, a comparison between offline and online supermarkets should also be of interest to future research. Online and offline purchases vary greatly in terms of the tangibility of the products and the active role of consumers in the purchasing process. These differences could also affect consumers' responses to suboptimal food, as psychological ownership has been shown to play an important role when selling suboptimal food (Tang et al. 2025).

Avenue #6: Taking characteristics of the buying situation more deeply into account

Prior research highlights that the effects of selling and marketing suboptimal food depend on situational (e. g., Chang and Su 2022; De Hooze et al. 2017; Suher et al. 2021) and consumer characteristics (e. g., Adel et al. 2022; Aydinli et al. 2023; Zhong 2025), which suggests that retailers should increasingly adapt their marketing efforts to the respective context. However, only few studies have examined state-based consumer characteristics in the context of suboptimal food. Future research should pay greater attention to consumers' shopping conditions and motivations. For example, it might make a difference whether people are shopping under time pressure or not. In addition, it would be worthwhile investigating whether consumers' shopping motivations (e. g., hedonic or utilitarian) influence their responses to suboptimal food. Moreover, research has shown that consumers behave differently when shopping alone or in groups (Otterbring 2021). Hence, it would be interesting to see whether the likelihood of purchasing suboptimal food decreases or increases when consumers are accompanied or observed by others.

5. Practical Implications for Retailers

The following section outlines the implications for retailers. It is structured around the three key topics identified in the literature.

First, the findings suggest that retailers should be cognizant of the positive and negative outcomes of selling suboptimal food. On the one hand, selling suboptimal food can have positive outcomes for retailers, as it enables them to monetize products that might otherwise be disposed. On the other hand, negative perceptions of suboptimal food can generate negative spillover effects on retailer perceptions (e. g.,

Pfeiffer et al. 2021). Research shows that these perceptions can translate into negative product-related outcomes, such as lower purchase intention (e. g., Cooremans and Geuens 2019) and reduced willingness to pay (e. g., Grewal et al. 2019), as well as retailer-related outcomes, such as patronage intention (Tang et al. 2022). Second, the findings reveal that retailers can actively shape consumer responses through appropriate marketing actions. Price reductions are among the most frequently studied marketing actions, as they can increase perceived value (e. g., Chang and Su 2022) and positively influence product-related outcomes, such as purchase intention (e. g., De Hooze et al. 2017). However, effective in the short term, price discounts may also create financial disadvantages for retailers. Accordingly, pricing alone appears insufficient as a sustainable long-term solution (Spielmann et al. 2023). Adding to this, the findings highlight the importance of complementary marketing actions. Several studies show that communication and anthropomorphism can positively influence consumer perceptions beyond price reductions. In particular, communication can shape consumer expectations regarding appropriate price reductions (e. g., Mookerjee et al. 2021) and may even generate positive effects on retailer-related outcomes, such as patronage intentions (Tang et al. 2022). Moreover, additional in-store services, such as shelf positioning and product bundling, represent a promising approach to foster positive outcomes of suboptimal food marketing (e. g., Hansen et al. 2024; Qi et al. 2022).

Third, when designing their marketing actions, retailers should also take situational and consumer characteristics into account. Regarding situational characteristics, retailers should pay particular attention to the specific type and degree of suboptimality, as different forms of suboptimality may trigger different consumer responses. The review reveals that marketing actions are most beneficial for food that is suboptimal due to appearance (Cao and Miao 2021; De Hooze et al. 2017) and exhibits a moderate degree of suboptimality (Lombart et al. 2019). Beyond situational characteristics, consumer characteristics also play a key role in shaping

Tab. 4 Future research avenues and exemplary research questions

Future Research Avenue	Exemplary Research Questions
A) Consequences of Selling Suboptimal Food on Consumer Perceptions and Retail Outcomes	
Avenue #1: Taking a closer look at the trade-off for retailers when selling suboptimal food	How does selling suboptimal food influence the overall perception of retailers? Does retail marketing for suboptimal food trigger negative perceptions of retailers (e. g., inequity, skepticism, manipulation)? How can retailers ensure positive perceptions of retail marketing for suboptimal food (e. g., through transparency or justification of retail marketing for suboptimal food)?
Avenue #2: Analyzing the long-term outcomes of selling suboptimal food	How do product-related outcomes (e. g., choice likelihood, willingness to pay) change over time? How does selling and purchasing suboptimal food affect long-term retailer-related outcomes (e. g., product repurchase behavior, store patronage)?
B) Effectiveness of Retailers' Marketing Actions for Suboptimal Food	
Avenue #3: Considering additional in-store services for suboptimal food	How does the in-store presentation of suboptimal food (e. g., separately vs. together with regular (optimal) products) influence product-related outcomes? Does providing in-store services such as recipes or preparation suggestions increase product-related outcomes for suboptimal food? Do service-related communications (e. g., retailers' efforts/investments in reducing food waste at the point of sale) improve consumers' perceptions of retailers?
Avenue #4: Examining interactions between marketing actions for suboptimal food	Do different retail marketing actions (e. g., pricing and presentation) interact with each other? Does the effectiveness of messages depend on the product presentation at the point of sale? Does the effectiveness of pricing vary for suboptimal products that are placed separately, instead of together with their original counterparts?
C) Situational and Consumer Characteristics Shaping the Effectiveness of Retailers' Marketing Actions for Suboptimal Food	
Avenue #5: Investigating the effects of selling suboptimal food in different sales channels	Do consumer reactions to suboptimal food vary for different types of retailers (e. g., discounter vs. supermarket)? How does the sales channel (online vs. offline) influence the likelihood of purchasing suboptimal food? Do consumers perceive different levels of psychological ownership or control when purchasing suboptimal food online (vs. offline)?
Avenue #6: Taking characteristics of the buying situation more deeply into account	To what extent does time pressure during a shopping situation influence consumers' reactions to suboptimal food? Does the purchase motive (e. g., utilitarian vs. hedonic) influence consumers' responses to suboptimal food? How does the presence of others affect consumers' perceptions and behaviors regarding suboptimal food?

the outcomes of suboptimal food. Besides stable consumer characteristics, retailers should pay more attention to state-based characteristics, such as cognitive load or times of purchase (Chung et al. 2025; White et al. 2016). Overall, the findings imply that effective management of suboptimal food in retail contexts requires that retailers' marketing actions are adapted to situational and consumer characteristics.

6. Conclusion

This paper provides a comprehensive review of the existing literature on selling suboptimal food from a retailer-centered perspective. Synthesizing more than two decades of research published in academic journals, the review sheds light on the consequences of selling suboptimal food, the effectiveness of retail marketing actions, and the varying impact across different contexts. Building on the conceptual model of customer experience creation from Verhoef et al. (2009) and Grewal et al. (2009) an integrative framework was developed that organizes and consolidates key findings from prior research while simultaneously identifying critical gaps and opportunities for future inquiry. By structuring existing evidence from a retail-centered perspective, the framework highlights how retailers' marketing actions and contextual conditions jointly shape consumer responses to suboptimal food that are highly relevant for retailers. Finally, promising research avenues and practical implications for retailers were outlined that can deepen the understanding of how suboptimal food can be effectively sold in retail settings and thereby contributes to more sustainable retail management practices.

References

Adel, A.M., Dai, X., & Roshdy, R.S. (2022). Investigating consumers' behavioral intentions toward suboptimal produce: an extended theory of planned behavior

– a cross-cultural study, *British Food Journal*, 124(1), 99–139.

Adel, A.M., Dai, X., & Roshdy, R.S. (2023). The psychological mechanism of consumers' behavioral intentions of suboptimal food products from the perspective of economic value, *British Food Journal*, 125(5), 1579–1612.

Ammann, J., Liechti, C., Mack, G., & Saleh, R. (2025). A food waste information-framing can help promote purchase of suboptimal potatoes, *Food Quality and Preference*, 123, 105338.

Aschemann-Witzel, J. (2018). Consumer perception and preference for suboptimal food under the emerging practice of expiration date based pricing in supermarkets, *Food Quality and Preference*, 63, 119–128.

Aschemann-Witzel, J., Giménez, A., & Ares, G. (2018). Consumer in-store choice of suboptimal food to avoid food waste: The role of food category, communication and perception of quality dimensions, *Food Quality and Preference*, 68, 29–39.

Aschemann-Witzel, J., Giménez, A., & Ares, G. (2020a). Suboptimal food, careless store? Consumer's associations with stores selling foods with imperfections to counter food waste in the context of an emerging retail market, *Journal of Cleaner Production*, 262, 121252.

Aschemann-Witzel, J., De Hooge, I. de, Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015). Consumer-Related Food Waste: Causes and Potential for Action, *Sustainability*, 7(6), 6457–6477.

Aschemann-Witzel, J., De Hooge, I.E. de, Rohm, H., Normann, A., Bossle, M.B., Grønhøj, A., & Oostindjer, M. (2017a). Key characteristics and success factors of supply chain initiatives tackling consumer-related food waste – A multiple case study, *Journal of Cleaner Production*, 155, 33–45.

Aschemann-Witzel, J., Jensen, J.H., Jensen, M.H., & Kulikovskaja, V. (2017b). Consumer Behaviour Towards Price-Reduced Suboptimal Foods in the Supermarket and the Relation to Food Waste in Households, *Appetite*, 116, 246–258.

Aschemann-Witzel, J., Otterbring, T., De Hooge, I.E. de, Normann, A., Rohm, H., Almli, V.L., & Oostindjer, M. (2019). The who, where and why of choosing suboptimal foods: Consequences for tackling food waste in store, *Journal of Cleaner Production*, 236, 117596.

Aschemann-Witzel, J., Otterbring, T., De Hooge, I.E. de, Normann, A., Rohm, H., Almli, V.L., & Oostindjer, M. (2020b). Consumer associations about other buyers of suboptimal food – And what it means for food waste avoidance actions, *Food Quality and Preference*, 80, 103808.

- Aydinli, A., Lu, F.-C., Baskin, E., Sinha, J., & Jain, S.P. (2023). Preference for Imperfect Produce: The Influence of Political Ideology and Openness to Experience, *Appetite*, 191, 107068.
- Barone, A.M., Donato, C., & Romani, S. (2021). Physically processing imperfect produce: The impact of prototypicality, *Journal of Consumer Behaviour*, 20(6), 1547–1561.
- Bernstad Saraiva Schott, A. & Andersson, T. (2015). Food Waste Minimization from a Life-Cycle Perspective, *Journal of environmental management*, 147, 219–226.
- Bolos, L.A., Lagerkvist, C.J., & Kulesz, M.M. (2019). Complementarity of implicit and explicit attitudes in predicting the purchase likelihood of visually sub-optimal or optimal apples, *Food Quality and Preference*, 75, 87–96.
- Bolos, L.A., Lagerkvist, C.-J., Nayga, R.M., & Edenbrant, A.K. (2022). Consumer preferences for visually sub-optimal food: Role of information framing and personal goals, *Resources, Conservation and Recycling*, 184, 106426.
- Bolos, L.A., Lagerkvist, C.-J., Normann, A., & Wendin, K. (2021). In the eye of the beholder: Expected and actual liking for apples with visual imperfections, *Food Quality and Preference*, 87, 104065.
- Cao & Miao (2021). Consumer Responses to Suboptimal Food Products, *Appetite*, 163, 105205.
- Cao, S., Gong, S., & Bai, L. (2023). Situational variables that affect consumers' suboptimal food purchasing behavior in China, *British Food Journal*, 125(1), 145–166.
- Castagna, A.C., Pinto, D.C., Mattila, A., & Barcellos, M.D. de (2021). Beauty-is-good, ugly-is-risky: Food aesthetics bias and construal level, *Journal of Business Research*, 135, 633–643.
- Chang, H.-H., Lu, L.-C., & Kuo, T.-C. (2024). Are discounts useful in promoting suboptimal foods for sustainable consumption and production? The interaction effects of original prices, discount presentation modes, and product types, *Journal of Retailing and Consumer Services*, 79, 103881.
- Chang, H.-H. & Su, J.-W. (2022). Sustainable consumption in Taiwan retailing: The impact of product features and price promotion on purchase behaviors toward expiring products, *Food Quality and Preference*, 96, 104452.
- Chen (2025). Drivers, inhibiting factors and facilitating factors influencing purchase intention of suboptimal foods among Taiwanese consumers, *British Food Journal*, 127(2), 715–737.
- Chen, Razzaq, A., Qing, P., & Cao, B. (2021). Do you bear to reject them? The effect of anthropomorphism on empathy and consumer preference for unattractive produce, *Journal of Retailing and Consumer Services*, 61, 102556.
- Chen, M.-F. (2024). Integrating the value–belief–norm model and the theory of planned behavior for explaining consumers' purchase intention of suboptimal food, *British Food Journal*, 126(9), 3483–3504.
- Choi, K.J., Jia, H.M., Lee, J.Y., Kim, B.K., & Kim, K. (2022). Hedonic myopia: Emphasizing hedonic benefits of non-perishable food makes consumers insensitive to expiration dates in food purchase, *Journal of Business Research*, 138, 193–202.
- Chung, Ahn, D., & Choi, Y.S. (2025). Miracle in the evening: Explaining the boundary condition of consumer's self-control on purchase intention of near-expired products, *Journal of Retailing and Consumer Services*, 82, 104125.
- Chung, J. & Li, D. (2013). The prospective impact of a multi-period pricing strategy on consumer perceptions for perishable foods, *British Food Journal*, 115(3), 377–393.
- Cooremans, K. & Geuens, M. (2019). Same but Different: Using Anthropomorphism in the Battle Against Food Waste, *Journal of Public Policy & Marketing*, 38(2), 232–245.
- De Hooge, I.E. (2025). Increasing the purchase intentions for suboptimal products: Comparing potential marketing strategies, *Food Quality and Preference*, 123, 105314.
- De Hooge, I.E., Oostindjer, M., Aschemann-Witzel, J., Normann, A., Loose, S.M., & Almlil, V.L. (2017). This apple is too ugly for me!, *Food Quality and Preference*, 56, 80–92.
- Do, K.T., Wang, C.-Y., & Guchait, P. (2021). When normative framing saves Mr. Nature: Role of consumer efficacy in proenvironmental adoption, *Psychology & Marketing*, 38(8), 1340–1362.
- Epley, N., Waytz, A., & Cacioppo, J.T. (2007). On Seeing Human: A Three-Factor Theory of Anthropomorphism, *Psychological review*, 114(4), 864–886.
- FAO (2019). *The State of Food and Agriculture 2019. Moving Forward on Food Loss and Waste Reduction*, Rome, Food and Agriculture Organization of the United Nations.

- Garnett, T. (2011). Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)?, *Food Policy*, 36, S23–S32.
- Grewal, D., Levy, M., & Kumar, V. (2009). Customer Experience Management in Retailing: An Organizing Framework, *Journal of Retailing*, 85(1), 1–14.
- Grewal, L., Hmurovic, J., Lamberton, C., & Reczek, R.W. (2019). The Self-Perception Connection: Why Consumers Devalue Unattractive Produce, *Journal of Marketing*, 83(1), 89–107.
- Hall-Phillips, A. & Shah, P. (2017). Unclear confusion and expiration date labels in the United States: A consumer perspective, *Journal of Retailing and Consumer Services*, 35, 118–126.
- Hansen, K., Misra, K., & Sanders, R.E. (2024). Uninformed Choices in Perishables, *Marketing Science*, 43(4), 751–777.
- Harcar, T. & Karakaya, F. (2005). A cross-cultural exploration of attitudes toward product expiration dates, *Psychology & Marketing*, 22(4), 353–371.
- Hartmann, T., Jahnke, B., & Hamm, U. (2021). Making ugly food beautiful: Consumer barriers to purchase and marketing options for Suboptimal Food at retail level – A systematic review, *Food Quality and Preference*, 90, 104179.
- Helmert, J.R., Symmank, C., Pannasch, S., & Rohm, H. (2017). Have an eye on the buckled cucumber: An eye tracking study on visually suboptimal foods, *Food Quality and Preference*, 60, 40–47.
- Hoang, T.-H., Le, Q.-H., Le, M.U., Ngo Vu Quynh, N., & Phan Nguyen, P.-L. (2025). “Don’t judge a book by its cover”: enhancing perceived quality and purchase intention of ugly food via retailers’ strategies, *British Food Journal*.
- Hulland, J. & Houston, M.B. (2020). Why systematic review papers and meta-analyses matter: An introduction to the special issue on generalizations in marketing, *Journal of the Academy of Marketing Science*, 48(3), 351–359.
- Kim, K., Ryoo, Y., Manika, D., Yoon, N., & Yoon, S. (2024). From ugly to attractive: Leveraging anthropomorphism to increase demand for irregular-appearing produce, *Psychology & Marketing*, 41(9), 2033–2056.
- Konuk, F.A. (2015). The effects of price consciousness and sale proneness on purchase intention towards expiration date-based priced perishable foods, *British Food Journal*, 117(2), 793–804.
- Koo, M., Oh, H., & Patrick, V.M. (2019). From Oldie to Goldie: Humanizing Old Produce Enhances Its Appeal, *Journal of the Association for Consumer Research*, 4(4), 337–351.
- Lagerkvist, C.J., Edenbrandt, A.K., Bolos, L.A., & Nayga, R.M. (2023). Consumer acceptance of aesthetically imperfect vegetables – The role of information framing and personal values: Evidence from the United States, *Food Quality and Preference*, 104, 104737.
- Li, S., Huang, X., Sheng, Y., & Chen, K. (2025). The interactive effect of recommendation subjects and message types on consumers’ suboptimal food purchase intentions, *Journal of Retailing and Consumer Services*, 84, 104200.
- Loebnitz, N. & Grunert, K.G. (2015). The effect of food shape abnormality on purchase intentions in China, *Food Quality and Preference*, 40, 24–30.
- Loebnitz, N. & Grunert, K.G. (2018). The impact of abnormally shaped vegetables on consumers’ risk perception, *Food Quality and Preference*, 63, 80–87.
- Loebnitz, N., Schuitema, G., & Grunert, K.G. (2015). Who Buys Oddly Shaped Food and Why? Impacts of Food Shape Abnormality and Organic Labeling on Purchase Intentions, *Psychology & Marketing*, 32(4), 408–421.
- Lombart, C., Millan, E., Normand, J.-M., Verhulst, A., Labbé-Pinlon, B., & Moreau, G. (2019). Consumer perceptions and purchase behavior toward imperfect fruits and vegetables in an immersive virtual reality grocery store, *Journal of Retailing and Consumer Services*, 48, 28–40.
- Louis, D. & Lombart, C. (2018). Retailers’ communication on ugly fruits and vegetables: What are consumers’ perceptions?, *Journal of Retailing and Consumer Services*, 41, 256–271.
- Mookerjee, S., Cornil, Y., & Hoegg, J. (2021). From Waste to Taste: How “Ugly” Labels Can Increase Purchase of Unattractive Produce, *Journal of Marketing*, 85(3), 62–77.
- Niu, Y., You, Y., Ran, Y., & Liu, J. (2023). “Unattractive = natural”: How explicit and implicit beliefs jointly affect consumer purchase of unattractive produce, *Psychology & Marketing*, 40(12), 2487–2503.
- Otterbring, T. (2021). Peer presence promotes popular choices: A “Spicy” field study on social influence and brand choice, *Journal of Retailing and Consumer Services*, 61, 102594.

- Pai, C.-Y., Young, K.-Y., Liska, L.I., & Laverie, D. (2024). I Know I Am Ugly, but Please Listen to My Story First: An Examination of How Storytelling Can Impact Consumers' Valuation of Unattractive Produce, *Journal of Consumer Behaviour*.
- Palmatier, R.W., Houston, M.B., & Hulland, J. (2018). Review articles: Purpose, process, and structure, *Journal of the Academy of Marketing Science*, 46(1), 1–5.
- Pfeiffer, B.E., Sundar, A., & Deval, H. (2021). Not too ugly to be tasty: Guiding consumer food inferences for the greater good, *Food Quality and Preference*, 92, 104218.
- Qi, D., Penn, J., Li, R., & Roe, B.E. (2022). Winning ugly: Profit maximizing marketing strategies for ugly foods, *Journal of Retailing and Consumer Services*, 64, 102834.
- Spielmann, N., Gomez, P., & Minton, E. (2023). The Role of the Ugly = Bad Stereotype in the Rejection of Misshapen Produce, *Journal of Business Ethics*.
- Stangherlin, I.d.C., Duarte Ribeiro, J.L., & Barcellos, M. (2019). Consumer behaviour towards suboptimal food products: a strategy for food waste reduction, *British Food Journal*, ahead-of-print(ahead-of-print).
- Suher, J., Szocs, C., & van Ittersum, K. (2021). When imperfect is preferred: the differential effect of aesthetic imperfections on choice of processed and unprocessed foods, *Journal of the Academy of Marketing Science*, 49(5), 903–924.
- Symmank, C., Zahn, S., & Rohm, H. (2018). Visually Suboptimal Bananas: How Ripeness Affects Consumer Expectation and Perception, *Appetite*, 120, 472–481.
- Szymkowiak, A., Antoniuk, M.A., & Maślana, N. (2024). Changing consumer attitudes towards suboptimal foods: The effect of zero waste labeling, *Food Quality and Preference*, 114, 105095.
- Tang, Kuang, Y., Li, H., Cao, B., & Qing, P. (2022). Labelling or not: influence of food retailer's approaching the expiration date labelling on consumers' patronage intention, *British Food Journal*, 124(9), 2817–2832.
- Tang, D., Zheng, M., Chen, W., & Huang, H. (2025). Do consumers prefer nearby ugly food? Examining the role of spatial-social distance in suboptimal produce preference, *Food Quality and Preference*, 129, 105516.
- Tarabashkina, L., Rajaguru, R., & Ho, K.K.K. (2025). What do consumers prioritise when selecting climate-affected produce and what trumps empathy towards farmers?, *Food Quality and Preference*, 126, 105426.
- Theotokis, A., Pramataris, K., & Tsiros, M. (2012). Effects of Expiration Date-Based Pricing on Brand Image Perceptions, *Journal of Retailing*, 88(1), 72–87.
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review, *British Journal of Management*, 14(3), 207–222.
- Tsalis, G. (2020). What's the deal? Consumer price involvement and the intention to purchase suboptimal foods. A cross-national study, *Food Quality and Preference*, 79, 103747.
- Tsiros & Heilman (2005). The Effect of Expiration Dates and Perceived Risk on Purchasing Behavior in Grocery Store Perishable Categories, *Journal of Marketing*(69(2)), 114–129.
- United Nations Environment Programme (2024). *Food Waste Index Report 2024*, Nairobi.
- van Giesen, R.I. & De Hooze, I.E. (2019). Too ugly, but I love its shape: Reducing food waste of suboptimal products with authenticity (and sustainability) positioning, *Food Quality and Preference*, 75, 249–259.
- Varese, E., Cesarani, M.C., & Wojnarowska, M. (2023). Consumers' perception of suboptimal food: strategies to reduce food waste, *British Food Journal*, 125(1), 361–378.
- Verhoef, P.C., Lemon, K.N., Parasuraman, A., Roggeveen, A., Tsiros, M., & Schlesinger, L.A. (2009). Customer Experience Creation: Determinants, Dynamics and Management Strategies, *Journal of Retailing*, 85(1), 31–41.
- White, K., Lin, L., Dahl, D.W., & Ritchie, R.J.B. (2016). When Do Consumers Avoid Imperfections? Superficial Packaging Damage as a Contamination Cue, *Journal of Marketing Research*, 53(1), 110–123.
- Xu, Y., Jeong, E., Jang, S., & Shao, X. (2021). Would you bring home ugly produce? Motivators and demotivators for ugly food consumption, *Journal of Retailing and Consumer Services*, 59, 102376.
- Yuan, J.J., Yi, S., Williams, H.A., & Park, O.-H. (2019). US consumers' perceptions of imperfect "ugly" produce, *British Food Journal*, 121(11), 2666–2682.
- Zhong, Y. (2025). Impact of the perceived value and perceived risk on consumers' purchase behavior of suboptimal food, *British Food Journal*, 127(2), 539–553.

Appendix A

Quantitative Approach

Table A1 Quantitative Approach

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Adel et al.	2022	Investigating consumers' behavioral intentions toward suboptimal produce: an extended theory of planned behavior – a cross-cultural study.	British Food Journal	Online survey	Suboptimal appearance		<i>Product:</i> Quality risk, financial risk, attitude <i>Consumer:</i> Social risk, psychological risk, subjective norms	Purchase intentions, intentions to recommend	<i>Consumer:</i> Environmental concern, food waste awareness, product familiarity, health consciousness, perceived behavioral control
Adel et al.	2023	The psychological mechanism of consumers' behavioral intentions of suboptimal food products from the perspective of economic value	British Food Journal	Online survey	Suboptimal appearance		<i>Product:</i> Perceived value (acquisition value and transaction value) <i>Consumer:</i> Price perception dimensions (price consciousness, price mavenism, sale proneness, price-quality schema, prestige sensitivity, face consciousness, face con-sciousness)	Purchase intentions, intentions to recommend	<i>Product:</i> Presence of suboptimality <i>Consumer:</i> Health consciousness, personal conservation behavior, gender, place of residence, age <i>Retail:</i> Type of retailer
Ammann et al.	2025	A food waste information-framing can help promote purchase of suboptimal potatoes	Food Quality and Preference	Online survey with scenario experiment	Suboptimal appearance	Communication (food waste information)		Product choice	

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Aschemann-Witzel	2018	Consumer perception and preference for suboptimal food under the emerging practice of Expiration date based pricing in supermarkets	Food Quality and Preference	Online survey with scenario experiment	Expiration date	Pricing (price discount) Communication (budget saving or food waste avoidance)	<i>Product:</i> Value for money, quality, potential risk <i>Consumer:</i> Preference for natural or organic food, normative beliefs about food waste avoidance, price-oriented behavior in food purchase, familiarity with stickers	Choice likelihood, likelihood of choosing the suboptimal instead the normal, likelihood of consuming, Likelihood of wasting	<i>Product:</i> Difficulty to assess edibility with senses, organic product <i>Consumer:</i> Preference for natural or organic food, normative beliefs about food waste avoidance, price-oriented behavior in food purchase, familiarity with stickers
Aschemann-Witzel et al.	2018	Consumer in-store choice of suboptimal food to avoid food waste: The role of food category, communication and perception of quality dimensions	Food Quality and Preference	Online survey with choice experiment	Suboptimal appearance, expiration date, damaged Packaging	Communication (economic saving or food waste avoidance)	<i>Product:</i> Appearance, taste, convenience, process quality, healthiness, freshness, price-value-relation, overall quality <i>Consumer:</i> Ascriptions to other buyers	Likelihood of choice	<i>Product:</i> Type of suboptimality <i>Consumer:</i> Age, gender, household size, presence of children, number of persons with income and high education in the household, location of residence, ownership of a car and house/apartment
Aschemann-Witzel et al.	2019	The who, where and why of choosing suboptimal foods: Consequences for tackling food waste in store	Journal of Cleaner Production	Online survey with scenario experiment	Suboptimal appearance, expiration date	Communication (self-centred, others-centred motives)	<i>Product:</i> Quality <i>Retailer:</i> Trust in retailer	Choice likelihood	<i>Product:</i> Type of Suboptimality <i>Consumer:</i> Value orientation (others-centred, self-centred) <i>Retail:</i> Type of retailer (Farmers market, supermarket)

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Aschemann-Witzel et al.	2020	Consumer associations about other buyers of suboptimal food – And what it means for food waste avoidance actions.	Food Quality and Preference	Online survey with scenario experiment	Suboptimal appearance, expiration date	Communication (budget-saving, avoiding food waste)	<i>Consumer:</i> Ascription of other buyers		<i>Product:</i> Presence of suboptimality, type of suboptimality <i>Consumer:</i> Environmental concern, value consciousness, respondent gender, buyer gender
Aydinli et al.	2023	Preference for imperfect produce: The influence of political ideology and openness to experience	Appetite	Online survey with scenario experiment (Study 1A, 1B, 2, Exploratory Study)	Suboptimal appearance			Preference for suboptimal food, purchase likelihood	<i>Product:</i> Presence of suboptimality <i>Consumer:</i> Political orientation, openness to experience
Barone et al.	2021	Physically Processing Imperfect Produce: The Impact of Prototypicality	Journal of Consumer Behavior	Online survey with scenario experiment (Study 1A, 1B, 2)	Suboptimal appearance		<i>Product:</i> Prototypicality	Product choice, purchase intention, willingness to pay	<i>Product:</i> Presence of suboptimality, level of processing
Bolos et al.	2019	Complementarity of implicit and explicit attitudes in predicting the purchase likelihood of visually sub-optimal or optimal apples	Food Quality and Preferences	Online survey	Suboptimal appearance		<i>Product:</i> Implicit attitude, explicit attitude	Purchase likelihood	<i>Product:</i> Presence of suboptimality
Bolos et al.	2021	In the eye of the beholder: Expected and actual liking for apples with visual imperfections.	Food Quality and Preferences	Survey (Study 1), Laboratory experiment (Study 2)	Suboptimal appearance		<i>Product:</i> Affective attitude, explicit liking, actual liking		<i>Product:</i> Presence of suboptimality, type of suboptimality

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Bolos et al.	2022	Consumer preferences for visually sub-optimal food: Role of information framing and personal goals	Resources Conversation and Recycling	Online survey with discrete choice experiment	Suboptimal appearance	Communication, (information, positive framing, negative framing)		Product choice	<i>Consumer:</i> Gain goals, hedonic goals, normative goals
Cao and Miao	2021	Consumer responses to suboptimal food products	Appetite	Online survey with scenario experiment	Suboptimal appearance, expiration date, damaged packaging		<i>Product:</i> Nutritional value, taste perception, quality perception, product evaluation, risk <i>Product:</i> Risk	Purchase intention, consumption intention, discard intention	<i>Product:</i> Type of suboptimality <i>Consumer:</i> Moral norms, financial attitudes
Castagna et al.	2021	Beauty-is-good, ugly-is-risky: Food aesthetics bias and construal level	Journal of Business Research	Experiment with eye-tracking (pilot Study), online survey with scenario experiment (Study 1, 2,3), laboratory experiment (Study 4), field experiment (Study 5)	Suboptimal appearance			Purchase intention	<i>Product:</i> Presence of suboptimality <i>Consumer:</i> Construal level
Chang et al.	2024	Are discounts useful in promoting suboptimal foods for sustainable consumption and production? The interaction effects of original prices, discount presentation modes, and product types	Journal of Retailing and Consumer Services	Online survey with scenario experiment	Expiration date	Pricing (discount presentation)	<i>Product:</i> Attitude	Purchase intention	<i>Product:</i> Product type, original price <i>Consumer:</i> Familiarity with EDBP, price involvement

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Chang and Su	2022	Sustainable consumption in Taiwan retailing: The impact of product features and price promotion on purchase behaviors toward expiring products	Food Quality and Preferences	Online survey with scenario experiment	Expiration date	Pricing (Price discount)	<i>Product:</i> Value	Purchase intention	<i>Product:</i> Degree of suboptimality, type of food <i>Consumer:</i> Familiarity with EDBP
Chen	2025	Drivers, inhibiting factors and facilitating factors influencing purchase intention of suboptimal foods among Taiwanese consumers	British Food Journal	Online survey	Suboptimal appearance, expiration date, damaged packaging		<i>Product:</i> Attitude	Purchase intention	<i>Consumer:</i> Health consciousness, price consciousness, food waste awareness, subjective norms, personal norms, perceived behavioral control
Chen et al.	2021	Do you bear to reject them? The effect of anthropomorphism on empathy and consumer preference for unattractive produce	Journal of Retailing and Consumer Services	Online survey with scenario experiment (Study 1, 2, 3)	Suboptimal appearance	Anthropomorphism (Human face, human like-features, human-like tone)	<i>Product:</i> Empathy, health risk, taste inference	Purchase intention	<i>Product:</i> Presence of suboptimality, popularity
Chen	2024	Integrating the value-belief-norm model and the theory of planned behavior for explaining consumers' purchase intention of suboptimal food	British Food Journal	Online survey	Suboptimal appearance, expiration date, damaged packaging		<i>Product:</i> Attitude	Purchase intention	<i>Consumer:</i> Values (egoistic, altruistic, biospheric), beliefs (ecological worldview, awareness of consequences, ascription of responsibility), norms (sense of obligation to choose suboptimal food), perceived behavioral control

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Choi et al.	2022	Hedonic myopia: Emphasizing hedonic benefits of non-perishable food makes consumers insensitive to Expiration dates in food purchase	Journal of Business Research	Secondary sales data (Study 1), field experiment (Study 2), online survey with scenario experiment (Study 3)	Expiration date	Communication (hedonic benefits, utilitarian benefits)	<i>Product</i> : Perceived nutritional quality	Purchase intention	<i>Product</i> : Degree of suboptimality
Chung et al.	2025	Miracle in the evening: Explaining the boundary condition of consumer's self-control on purchase intention of near-expired products	Journal of Retailing and Consumer Services	Sales data analysis (Study 1), online survey with scenario experiment (Study 2, 3)	Expiration date		<i>Consumer</i> : Self control	Purchase intention	<i>Product</i> : Degree of suboptimality <i>Consumer</i> : Time of shopping
Cooremans and Geuens	2019	Same but Different: Using Anthropomorphism in the Battle Against Food Waste	Psychology and Marketing	Online survey with scenario experiment (Pilot Study, Study 2, 3) laboratory experiment (Study 1)	Expiration date	Anthropomorphism (Human body,	<i>Product</i> : Taste <i>Consumer</i> : Affective response	Purchase intention	<i>Product</i> : Presence of suboptimality <i>Consumer</i> : Environmental concern
De Hooge	2025	Increasing the purchase intentions for suboptimal products: Comparing potential marketing strategies	Food Quality and Preference	Online survey with scenario experiment (Study 1, Study 2)	Suboptimal appearance	Pricing (price discount, multi-item promotion) Communication (naturalness, food waste avoidance, taste, experience)	<i>Product</i> : Perception	Product choice, purchase intention	<i>Consumer</i> : Egoistic orientation, altruistic orientation, biospheric orientation

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
De Hooge et al.	2017	This apple is too ugly for me!	Food Quality and Preference	Online survey with choice experiment	Suboptimal appearance, expiration date, damaged packaging		<i>Consumer:</i> Perceived effectiveness	Product choice, purchase likelihood	<i>Product:</i> Type of suboptimality <i>Consumer:</i> Nationality, gender, age, education, household, value orientation, food waste awareness
Do et al.	2021	When normative framing saves Mr. Nature: Role of consumer efficacy in proenvironmental adoption	Psychology and Marketing	Online survey with scenario experiment (Study 4), Studies 1–3 are conducted in a different contexts (hotel & banking)	Suboptimal appearance	Communication (normative gain, normative loss)	<i>Consumer:</i> Collective-efficacy, self-efficacy	Purchase intention, willingness to pay extra	
Grewal et al.	2019	The Self-Perception Connection: Why Consumers Devalue Unattractive Produce	Journal of Marketing	Online survey with scenario experiment (Study 1, 2, Study 4B), laboratory experiment (Study 3), field experiment (Study 4A)	Suboptimal appearance	Communication (boosting self-esteem)	<i>Consumer:</i> Self-perception, self-diagnostic value	Product choice, purchase intention, willingness to pay	<i>Product:</i> Presence of suboptimality
Hansen et al.	2024	Uninformed Choices in Perishables	Marketing Science	Field experiment	Expiration date	Pricing (dynamic pricing), In-Store Service (Shelf organization)	<i>Consumer:</i> Mental gaps, search costs	Product choice	<i>Product:</i> Type of product, degree of suboptimality
Harcar and Karakaya	2005	A Cross-Cultural Exploration of Attitudes toward Product Expiration dates	Psychology and Marketing	Survey	Expiration date		<i>Product:</i> Importance of expiration date, uncertainty avoidance		<i>Product:</i> Product type <i>Consumer:</i> Place of residence
Helmert et al.	2017	Have an eye on the buckled cucumber: An eye tracking study on visually suboptimal foods	Food Quality and Preference	Choice experiment with eye tracking	Suboptimal appearance	Communication (price and taste in red or green)		Time to fixation, total fixation duration, attention distribution, product choice, purchase intention	<i>Product:</i> Presence of suboptimality

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Hoang et al.	2025	"Don't judge a book by its cover": enhancing perceived quality and purchase intention of ugly food via retailers' strategies	British Food Journal	Survey	Suboptimal appearance	Communication (traceability information) Anthropo-morphism (the birth and growth) Presentation (Product sampling)Symmank	<i>Product:</i> Healthiness, safety, tastiness	Purchase intention	<i>Consumer:</i> Price consciousness
Kim et al.	2024	From ugly to attractive: Leveraging anthropomorphism to increase demand for irregular-appearing produce	Psychology and Marketing	Online survey (Pretest), online survey with scenario experiment (Study 1, 2, 3)	Suboptimal appearance	Anthropomorphism (googly eyes, human names)	<i>Product:</i> Attractiveness	Purchase intention	<i>Product:</i> Presence of suboptimality <i>Retail:</i> Type of retailer
Konuk	2015	The effects of price consciousness and sale proneness on purchase intention towards Expiration date-based priced perishable foods	British Food Journal	Online survey	Expiration date	Pricing (Price discount)		Purchase intention	<i>Consumer:</i> Price consciousness, sale proneness
Koo et al.	2019	From Oldie to Goldie: Humanizing Old Produce Enhances Its Appeal	Journal of the Association for Consumer Research	Online survey with scenario experiments (Study 1, 2, 3, 4)	Suboptimal appearance	Anthropomor-phism (Human face, human activity)	<i>Product:</i> Evaluations <i>Consumer:</i> warm feelings		<i>Product:</i> Presence of suboptimality
Lagerkvist et al.	2023	Consumer acceptance of aesthetically imperfect vegetables—the role of information framing and personal values: evidence from the United States	Food Quality and Preference	Only survey with discrete choice experiment	Suboptimal appearance	Communication (gain framed information, loss framed information)	<i>Product:</i> Acceptance		<i>Product:</i> Type of suboptimality, Origin, Type of product, price <i>Consumer:</i> Openness to change, self-transcendence, self-enhancement, conservation

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Li et al.	2025	The interactive effect of recommendation subjects and message types on consumers' suboptimal food purchase intentions	Journal of Retailing and Consumer Services	Online survey with scenario experiment (Study 1, 2)	Suboptimal appearance, expiration date, damaged packaging	Communication (fact-based, affect-based, scarcity cues)		Purchase intention	<i>Retail:</i> Recommendation subject (AI vs. human) <i>Consumer:</i> Green identity
Loebnitz and Grunert	2015	The effect of food shape abnormality on purchase intentions in China	Food Quality and Preference	Online survey with scenario experiment	Suboptimal appearance			Purchase intention	<i>Product:</i> Presence of suboptimality, degree of suboptimality <i>Consumer:</i> Environmental concern, social trust
Loebnitz and Grunert	2018	The impact of abnormally shaped vegetables on consumers' risk perception	Psychology & Marketing	Online survey with scenario experiment (Study 1, 2)	Suboptimal appearance		<i>Product:</i> Risk, unnaturalness	Purchase intention	<i>Product:</i> Presence of suboptimality <i>Consumer:</i> Objective knowledge, subjective knowledge
Loebnitz et al.	2015	Who Buys Oddly Shaped Food and Why? Impacts of Food Shape Abnormality and Organic Labeling on Purchase Intentions	Psychology & Marketing	Online survey with scenario experiment	Suboptimal appearance			Purchase intention	<i>Product:</i> Presence of suboptimality, degree of suboptimality, product type <i>Consumer:</i> Pro-environmental self-identity, problem awareness
Lombart et al.	2019	Consumer perceptions and purchase behavior toward imperfect fruits and vegetables in an immersive virtual reality grocery store	Journal of Retailing and Consumer Services	Survey with choice experiment	Suboptimal appearance		<i>Product:</i> Appearance, quality, price fairness	Purchase behavior	<i>Product:</i> Presence of suboptimality, Degree of suboptimality

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Louis and Lombart	2018	Retailers' communication on ugly fruits and vegetables: What are consumers' perceptions?	Journal of Retailing and Consumer Services	Online survey with scenario experiment	Suboptimal appearance	Communication (health, taste, price)	<i>Retailer:</i> Legitimacy, credibility, trust, attitude		<i>Retail:</i> Type of retailer, corporate social responsibility policy, price image
Mookerjee et al.	2021	From Waste to Taste: How "Ugly" Labels Can Increase Purchase of Unattractive Produce	Journal of Marketing	Field experiment (Study 1, Study 6b), Online survey with scenario experiments (Study 2, 3, 4, 5, 6a)	Suboptimal appearance	Communication (ugly Label) Pricing (price discount)	<i>Product:</i> Tastiness, healthiness, naturalness	Purchase likelihood	<i>Product:</i> Presence of suboptimality
Niu et al.	2023	"Unattractive = natural": How explicit and implicit beliefs jointly affect consumer purchase of unattractive produce	Psychology and Marketing	Laboratory experiment (Study 1, Study 3) Field experiment (Study 2)	Suboptimal appearance		<i>Consumer:</i> Implicit beliefs, explicit beliefs, Elaborative thinking	Product choice, purchase intention	<i>Product:</i> Presence of suboptimality
Pai et al.	2024	I Know I Am Ugly, but Please Listen to My Story First: An Examination of How Storytelling Can Impact Consumers' Valuation of Unattractive Produce	Journal of Consumer Behaviour	Online survey with scenario experiment (Study 1, Study 2)	Suboptimal appearance	Communication (storytelling)	<i>Product:</i> Taste	Willingness to pay, purchase intention, coupon usage	<i>Product:</i> Presence of suboptimality
Pfeiffer et al.	2021	Not too ugly to be tasty: Guiding consumer food inferences for the greater good	Food Quality and Preference	Online survey with scenario experiment (Study 1, 2, 3)	Suboptimal appearance		<i>Product:</i> Perception of beauty, taste, health, quality <i>Retailer:</i> Seller Competence		<i>Product:</i> Presence of suboptimality <i>Retail:</i> Type of retailer
Qi et al.	2022	Winning ugly: Profit maximizing marketing strategies for ugly foods	Journal of Retailing and Consumer Services	Online survey with discrete choice experiment	Suboptimal appearance	Communication (food waste, naturalness) In-Store service (Bundling)		Willingness to pay	<i>Retail:</i> Type of retailer

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Spielmann et al.	2023	The Role of the Ugly = Bad Stereotype in the Rejection of Mishappen Produce	Journal of Business Ethics	Implicit attitude test (Study 1), Online survey with scenario experiment (Study 2, 3A), Field experiment (3B)	Suboptimal appearance	Communication (evaluative conditioning)	<i>Consumer:</i> Disgust, negative moral associations	Consumption likelihood, purchase intention	<i>Product:</i> Presence of suboptimality <i>Consumer:</i> Moral disgust sensitivity
Suher et al.	2021	When imperfect is preferred: the differential effect of aesthetic imperfections on choice of processed and unprocessed foods	Journal of the Academy of Marketing Science	Field experiment (Study 1), Online survey with scenario experiment (Study 2), Online survey with choice experiment (Study 3a, 3b, 4, 5, 6)	Suboptimal appearance	Communication (human care information)	<i>Product:</i> Human care perception	Preference for imperfect food, willingness to pay	<i>Product:</i> Presence of suboptimality, level of processing
Symmank et al.	2018	Visually suboptimal bananas: How ripeness affects consumer expectation and perception	Appetite	Laboratory experiment	Suboptimal appearance		<i>Product:</i> Overall liking, sensory expectation, sensory perception <i>Consumer:</i> Importance of shelf-life, general liking of bananas, frequency of buying bananas, meanings of sustainability	Purchase intention	<i>Product:</i> Degree of suboptimality <i>Product:</i> Intended use <i>Consumer:</i> Importance of shelf-life, general liking of bananas, frequency of buying bananas, meanings of sustainability
Szymkowiak et al.	2024	Changing consumer attitudes towards suboptimal foods: The effect of zero waste labeling	Food Quality Preferences	Online survey with scenario experiment	Damaged Packaging	Communication (zero waste label)	<i>Product:</i> Attitude, perception	Expectation for discount, willingness to buy	<i>Product:</i> Presence of suboptimality <i>Consumer:</i> Environmental concern

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Tang et al.	2022	Labelling or not: influence of food retailer's approaching the Expiration date labelling on consumers' patronage intention	British Food Journal	Laboratory based scenario experiment (pretest 1), Online survey with scenario experiment (study 1, pretest 2, study 2)	Expiration date	Communication (approaching the expiration date labelling)	Retailer: Perception of retailer's concern for consumers	Patronage intention	Retailer: Mandatory vs. voluntary labelling behavior
Tang et al.	2025	Do consumers prefer nearby ugly food? Examining the role of spatial-social distance in suboptimal produce preference	Food Quality and Preference	Online survey with scenario experiment (Study 1a, 1b, 2, 3)	Suboptimal appearance	Communication (psychological distance, gain framing, loss framing)	Product: Quality Consumer: Psycho-logical ownership	Purchase intention	Product: Presence of suboptimality
Tarabashkina et al.	2025	What do consumers prioritise when selecting climate-affected produce and what trumps empathy towards farmers?	Food Quality and Preference	Discrete choice experiment (Study 1, 2)	Suboptimal appearance	Communication (climate event), Pricing (discounted, inflated)	Retailer: Empathy towards farmer	Product choice	Product: Presence of suboptimality Consumer: Environmental self-identity, gender, financial constraint Retail: Type of retailer
Theotokis et al.	2012	Effects of Expiration date-Based Pricing on Brand Image Perceptions	Journal of Retailing	Field experiment (study 1, 2), online survey with scenario experiment (Study 3, 4)	Expiration date	Communication (promotion framing, expiration date based image Pricing (Expiration date Based Pricing)	Retailer: Distrust, brand image		Consumer: Expiration date risk, familiarity Retail: Brand loyalty
Tsalis	2020	What's the deal? Consumer price involvement and the intention to purchase suboptimal foods. A cross-national study	Food Quality and Preference	Online survey	Suboptimal appearance, expiration date, damaged packaging			Purchase intention	Consumer: Deal proneness, price consciousness, value consciousness, price-quality schema, prestige sensitivity, perceived budget constraints, household's composition, education level, age

Table A1 Quantitative Approach (Continued)

Author(s)	Year	Title	Journal	Method	Type of Suboptimality	Retailers' Marketing Actions	Perceptions	Outcomes	Contextual Factors
Tsiros and Heilman	2005	The Effect of Expiration dates and Perceived Risk on Purchasing Behavior in Grocery Store Perishable Categories	Journal of Marketing	Online survey	Expiration date		<i>Product:</i> Functional risk, performance risk, physical risk <i>Consumer:</i> Psychological risk, social risk, financial risk	Frequency of checking expiration date, willingness to pay	<i>Product:</i> Degree of suboptimality, product type <i>Consumer:</i> Household consumption rate
van Giesen and De Hooze	2019	Too ugly, but I love its shape: Reducing food waste of suboptimal products with authenticity (and sustainability) positioning	Food Quality & Preference	Laboratory based scenario experiment (Study 1), online survey with scenario experiment (Study 2)	Suboptimal appearance	Communication (sustainability positioning, authenticity positioning), Pricing (price discount)	<i>Product:</i> Quality	Purchase intention, purchase choice	
White et al.	2016	When do consumers avoid imperfections? Superficial packaging damage as a contamination cue	Journal of Marketing Research	Survey with scenario experiments (study 1, 2, 3, 4, 5, 6)	Damaged packaging	Presentation	<i>Product:</i> Attitude, perceived healthiness, safety, contamination	Purchase intention	<i>Product:</i> Degree of suboptimality, product type <i>Consumer:</i> Need for cognition, cognitive load, intended use of product
Xu et al.	2021	Would you bring home ugly produce? Motivators and demotivators for ugly food consumption	Journal of Retailing and Consumer Services	Online survey	Suboptimal appearance		<i>Product:</i> Attitude	Purchase intention	<i>Product:</i> Presence of suboptimality, quality inferior <i>Consumer:</i> Price consciousness, pro-environmental identity
Zhong	2025	Impact of the perceived value and perceived risk on consumers' purchase behavior of suboptimal food	British Food Journal	Survey	Suboptimal appearance, expiration date, damaged packaging		<i>Product:</i> Risk, value	Purchase	<i>Product:</i> Type of suboptimality <i>Consumer:</i> Suboptimal food knowledge, gender, education, income, age

Tabel A2 Qualitative Approach

Author(s)	Year	Title	Journal	Method	Key Findings
Cao et al.	2023	Situational variables that affect consumers' suboptimal food purchasing behavior in China	British Food Journal	In-depth interviews	Identification of nine factors influencing consumers' purchase behavior towards suboptimal food: Prompts, hygienic condition and food safety grades of grocery, services capes, people, positions, emotion, face concept, perceived convenience, perceived quality safety.
Hall-Phillips and Shah	2017	Unclarity confusion and Expiration date labels in the United States: A consumer perspective	Journal of Retailing and Consumer Services	In-depth interviews	Inconsistent formats, different package locations and types for expiration dates lead to confusion among consumers. This confusion has emotional (e. g., uncertainty), cognitive (e. g., misinterpretation), and behavioral (e. g., waste of food) consequences.
Stangherlin et al.	2019	Consumer behaviour towards suboptimal food products: a strategy for food waste reduction	British Food Journal	Open-ended survey, focus group discussion	Identification of key factors why consumers reject suboptimal food: Safety concerns, poor handling, ability to eat, lack of familiarity, use of pesticides, poor quality
Yuan et al.	2019	US consumers' perceptions of imperfect "ugly" produce	British Food Journal	Focus group discussions	Identification of two consumer groups: Influencers (are familiar with suboptimal food, have already consumed it and would consume it again in the future), learners (learn from influencers and adapt their perceptions). Identification of nine factors influencing consumers' attitudes and behavior towards suboptimal food: food safety, price sensitivity, location of Sale, product display, name, purpose of use, fun, targeted education, food waste

Table A3 Mixed-Methods Approach

Author(s)	Year	Title	Journal	Method	Key Findings
Aschemann-Witzel et al.	2020	Suboptimal food, careless store? Consumer's associations with stores selling foods with imperfections to counter food waste in the context of an emerging retail market	Journal of Cleaner Production	Mixed-methods approach (online survey with scenario experiments, open ended questions)	Selling and promoting suboptimal food affects consumers' associations with retailers in four dimensions: Practices of the supermarket, relationship with consumers and responsibility for consumers, signal and assessment of products, product and choice
Chung and Li	2013	The prospective impact of a multi-period pricing strategy on consumer perceptions for perishable foods.	British Food Journal	Mixed method approach (in-depth interviews, online survey)	Multi-period pricing strategies lead to higher satisfaction, with satisfaction being influenced by the product category.