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Research Paper

"Fairness" in Agrifood Systems as Marketing Strategy to Reduce Food Waste by 2027

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ABSTRACT

The complexity of modern agri-food systems, characterized by globalized supply chains and diverse stakeholders, amplifies the risk of waste and increasingly shapes market perceptions and value creation dynamics. Food loss and waste remain a critical challenge, impacting environmental sustainability, economic efficiency, and social equity, as well as consumer trust and brand legitimacy. This study explores the strategic role of fairness in supply chain management (SCM) within the Portuguese agrifood sector, focusing on its potential as a governance and value-signalling factor to achieve ambitious food waste reduction goals by 2027. Fairness could be seeing as a mechanism that enhances transparency, fosters equitable relationships, and mitigates opportunistic behaviours across the supply chain, thereby reinforcing reputational capital and shared value. To address the complexity and future orientation inherent in this topic, and its implications for long-term market positioning, the Delphi method was selected, supported in 24 experts, from Academic, Public and Private sectors. Through successive rounds of structured questionnaires, expert opinions were solicited, evaluated, and refined to forecast two interrelated trajectories for Portugal by 2027: i) local procurement for institutional settings, specifically that all public and private schools will be predominantly supplied by local, certified sustainable producers, strengthening place-based value propositions; and ii) a national food waste reduction to 15% of national production, contributing to competitive differentiation at the sectoral level. The expert panel indicated strong confidence in achieving both projections. Crucially, the target reduction of food waste to 15% received the strongest consensus (mean 4.4; standard deviation 0.6), reinforcing the plausibility and communicability of this goal. The findings suggest that fairness-driven policies and practices can significantly contribute to achieving national food waste reduction goals, offering actionable guidance for managers and clear implications for governance, operational processes, sustainability, and marketing and communication strategies that enhance legitimacy and stakeholder trust.

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1. INTRODUCTION

Transparency, fairness, social responsibility and ethics could be pointed as some key points that the agri-food sector will face in the next decade. Grzybowska (2021) established a relationship between supply chain management and big global transformations. The study identifies three predominant trends within supply chains, each corresponding to distinct dimensions of global change: i) the digital supply chain, designed to enable Industry 4.0 integration; ii) the resilient supply chain, aimed at mitigating disruptions caused by unforeseen events, such as the COVID-19 pandemic; and iii) sustainable supply chain, intended to foster responsible practices among producers and consumers.

Several scholarly contributions propose strategies to address emerging challenges in the agri-food sector, which include enhancing decision-making processes in production and storage to optimize profitability (Chen et al., 2021); integrating Corporate Social Responsibility practices within agri-food enterprises to improve economic outcomes (Sgroi et al., 2020); implementing measures to minimize food waste through the valorisation of by-products and the use of recycled food resources (Lu et al., 2024); and promoting localized agri-food systems grounded in agroecological principles (López-García & González de Molina, 2021).

According to data published by the Food and Agriculture Organization (FAO) of the United Nations in 2015, approximately 795 million individuals worldwide remained undernourished (FAO, IFAD, & WFP, 2015). This figure reflects a reduction of 167 million compared to the preceding decade and a decrease of 216 million relative to the 1990-1992 baseline. Despite this progress, the data indicate that more than one in nine people globally continue to lack sufficient access to food necessary to sustain an active and healthy life. However, recent data from FAO et al. (2025) reports a reduction in global hunger prevalence, with 8.2% of the world's population

affected in 2024, compared to 8.7% in 2022. Beyond the issue of hunger, approximately 28% of the global population experienced moderate or severe levels of food insecurity in 2024.

The complexity of modern agri-food systems, characterized by globalized supply chains and diverse stakeholders, amplifies the risk of waste. In developing countries, losses often occur during production and storage due to inadequate infrastructure and logistics, whereas in developed nations, consumer behaviour and retail standards drive waste at later stages. These inefficiencies disrupt supply-demand equilibrium, inflate costs, and reduce the resilience of food systems, (Goncalves, Anjos, & Guine, 2025).

Conversely, food waste refers to the loss of food that remains suitable for human consumption from the supply chain, either deliberately or because of spoilage and expiration. Such waste typically occurs at the retail and consumer levels and is frequently linked to poor stock management, neglect, or behavioural choices. While food loss reflects upstream inefficiencies, food waste highlights downstream issues related to consumption patterns and retail practices, both of which contribute substantially to global food system inefficiency.

Aktas et al. (2018) underlined that in recent past, global economic, social and sustainable initiatives, such as the Sustainable Development Goals (SDG) and carbon neutrality targets published by UNESCO, have prompting higher food waste concerns, pressuring a more integrated and sustainable understanding. As highlighted by FAO, on a global scale, approximately one-third of all food produced is lost or wasted (Food and Agriculture Organization [FAO], 2011), contributing to greenhouse gas emissions, resource depletion, and missed opportunities for food security. This study was designed for a 10-year period, starting in 2016 with the objective to collect secondary data from food waste based on PERDA project (Projeto de Estudo e Reflexão sobre o Desperdício Alimentar/Study and Reflection Project on Food Waste). The 2016 was declared as the "National Year for Combating Food Waste" in Portugal at the national level. In 2016, it was estimated that food waste in Portugal represented about 17% of national production, confirming the global indicators, highlighting the urgency for systemic interventions. Referring to Table 1, which is the study of PERDA (2013) in Portugal, it shows the values of average food waste in the different links of the value chain between 2013 and 2015.

Table 1. Food waste by links in the food supply chain- 2013/2015 Annual

Links in the food supply chain - Variables	Years Period Total 2013 / 2015 Ton.	%
Primary production	332000	32.2
Food industry	77 000	7.5
Food trade and distribution	298 000	28.9
****Catering, hospitality and similar services**	0	0.0
Households	324 000	31.4
Total	***1 031 000**	100

Source. PERDA (2013)

*Approximately.
**Not available.

Nevertheless, recent data indicate a progressive increase in per capita food waste in Portugal over the period of 2020 to 2022, compared with 2013 to 2015. In addition, the average amount of food discarded per individual rose from 174.5 kilograms in 2020 to 180.6 kilograms in 2021, reaching 184 kilograms in 2022 (Instituto Nacional de Estatística, [INE], 2023).

Referring to Table 2, in 2023, the total volume of food waste in Portugal was estimated at approximately 1.9 million tons. The primary contributors to this waste were households, responsible for 66.8% of the total (Instituto Nacional de Estatística, [INE], 2023).

Table 2. Food waste by links in the Portuguese food supply chain (2020-2023)

Years / Links in the food supply chain – Variables (ton.)	2020	%	2021	%	2022	%	2023	%
Primary production	101 388	5.2	131 211	6.8	110 980	5.7	131 266	6.8
Food industry	61 719	3.2	75 257	3.9	64 572	3.3	55 811	2.9
Food trade and distribution	214 233	11.1	224 838	11.6	227 908	11.8	232 420	12.0
****Catering, hospitality and similar services**	161 399	8.4	162 903	8.4	220 493	11.4	223 067	11.5

Households	1 273 572	**65.9**	1 285 442	**66.5**	1 302 531	**67.4**	1 290 330	**66.8**
Total	**1 812 311**	93.8	**1 879 652**	97.2	**1 926 484**	99,6	**1 932 893**	100

Source. Adapted from INE (2023).

Other significant sources included the retail and distribution sector (12%), food service establishments, such as restaurants and hotels (11.5%), primary production activities (6.8%), and the food processing industry (2.9%) (Instituto Nacional de Estatística, [INE], 2023). An analysis of the temporal evolution from 2020 to 2023 reveals a general upward trend in household food waste, although a slight decline was observed in 2023. In contrast, food waste originating from retail and distribution has shown a consistent increase throughout the period. The hospitality sector experienced a notable rise in food waste between 2021 and 2022, followed by a marginal increase in 2023.

In this study, fairness is understood as a multidimensional governance and marketing construct encompassing distributive fairness (price and value allocation), procedural fairness (decision-making transparency), and interactional fairness (communication, trust, and respect among supply-chain actors). Building upon the context outlined above, this study explores the strategic role of fairness in supply chain management (SCM) within the Portuguese agrifood sector, focusing on its potential as a strategy to reduce food waste by 2027, inform operational procedures, and aid in governance framework decisions. To achieve this, the Delphi method was selected to generate informed projections from a panel of national experts, which constitute members of public, private, and academic sectors. The core objective is to assess the feasibility of two specific, fairness-aligned projections: i) ensuring that by 2027, all Portuguese public and private schools are predominantly supplied by local, certified sustainable producers; and ii) reducing national food waste to 15% of national production by 2027. Related to the paper's subject, this study offers a complementary, policy-oriented perspective on how a fairness-driven agri-food chain can contribute to minimizing food waste.

Existing research clearly distinguishes between different forms of fairness and shows that an increasing number of agri-food firms are paying attention to fairness-related values. However, there is still limited empirical evidence on how these principles are implemented in practice within Portuguese agri-food supply chains. Little is known about how firms translate fairness commitments into concrete actions, how they communicate these practices, and how much

importance they assign to them in the products they bring to market. This study addresses this gap through a comprehensive and integrative analytical approach.

The remainder of this paper is structured as follows. Section 2 reviews the pertinent literature, establishing the conceptual frameworks for agri-food systems, the strategic relevance of fairness in SCM, and the distinction between food waste and loss. Section 3 details the research methodology, providing a rigorous justification for the use of the Delphi technique and outlining the panel selection and iterative procedures employed. Section 4 presents the quantitative results from the expert panel, including the mean, standard deviation, and coefficient of variation for the two key projections. Finally, Section 5 and 6 discuss the policy implications of fairness-driven strategies, address the study's limitations, and conclude with a forward-looking assessment of the potential for sustainable change

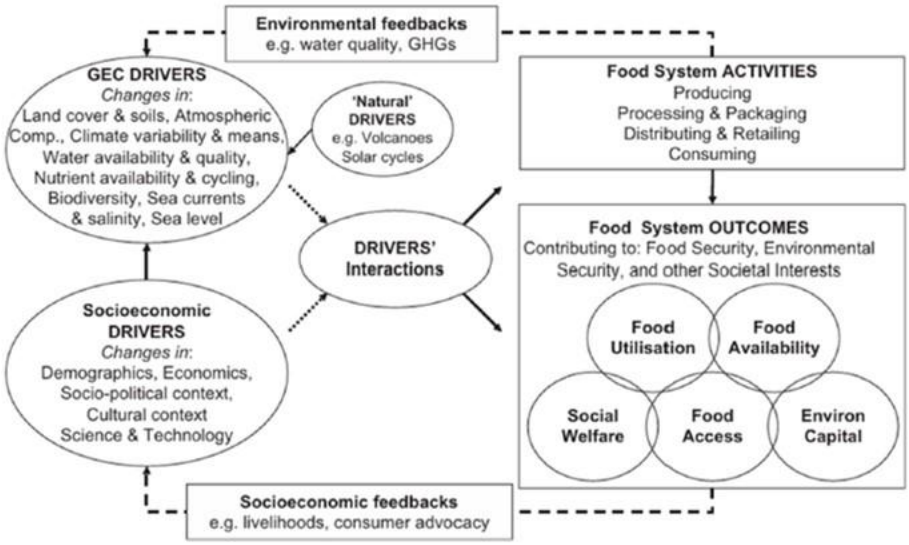
2. LITERATURE REVIEW

2.1 Agri-Food Systems

To conceptualize the complexity of agrifood systems, their interdependent components, and the implications for human and planetary health, Ericksen (2008) introduced a comprehensive food systems framework (Figure 1) to examine food security within the context of global environmental and social change. This framework broadened the traditional notion of 'food systems,' moving beyond the linear sequence from production to consumption to encompass the activities themselves, their socioeconomic and environmental drivers, associated outcomes, and the importance of feedback loops connecting these elements. Drivers are defined as dynamic changes within natural and human systems and their interactions that shape agrifood system activities. These activities span the entire food supply chain, from production through consumption. Production includes all processes related to cultivating, growing, and harvesting raw food materials of plant and animal origin. Processing, manufacturing, and packaging involve the transformation of raw materials, such as fruits, vegetables, and livestock, into value-added products, ready to sell into different market operators. Distribution and retail refer to the logistical and marketing processes that move food products from production and processing stages to consumer markets. Consumption encompasses the preparation, ingestion, and digestion of food products. The framework identifies key outcomes, including food security, environmental integrity, and social well-being, with particular emphasis on food security determinants, such as

availability, access, and utilization. Subsequent studies have expanded this systems-based perspective by emphasizing governance coordination, value-chain integration, and market-based mechanisms as critical determinants of agrifood system performance (e.g., Barling et al., 2022; Samoggia et al., 2023).

Figure 1. Food Systems Conceptual Framework.



Source. Ericksen (2008).

2.2 Fairness in Supply Chain Management

Findings from the literature review indicate that a universally accepted definition of fairness has not yet been established. Brown et al. (2005) conceptualize fairness as a multidimensional construct encompassing equitable rewards, procedural consistency, the opportunity for voice, and two way communication. In a related vein, Duffy et al. (2013) associate fairness with elements such as price equity, payment conditions, cost sharing, reciprocal communication, comparative treatment vis à vis other suppliers, conflict resolution mechanisms, access to information, awareness of operating conditions, and the presence of mutual respect among exchange partners. Many of those "fairness characteristics" are about marketing managing.

Within the agri-food supply chain, the remuneration based on price strategies as a marketing tool, that each participant receives for their products is commonly conceptualized as an outcome of exchange relationships. Consequently, distributive fairness primarily concerns price fairness, understood as the way prices and revenues are allocated among actors along the supply chain (Lu, F. et Al, 2021). A substantial number of researchers associates distributive fairness with the allocation of economic returns among supply chain participants. Price fairness, in particular, represents a relatively recent construct, drawing largely on theories of justice and equity (Diller, H., 2008). In this regard, Yeoman and Santos (2016) characterize outcome fairness-closely aligned with distributive fairness-through dimensions such as equitable pricing and payment conditions, as well as the establishment of fair working conditions for employees.

Fairness encompasses ethical sourcing, equitable distribution of value, and inclusive governance. In agrifood systems, fairness can mitigate power imbalances between producers, distributors, and retailers. Oláh et al. (2022) argue that household food waste is influenced by socio-economic factors, suggesting that fairness must extend to consumer education and access.

The concept of fairness has emerged as a critical concern for consumers, policymakers, and industry stakeholders (European Commission, 2020). Growing societal and consumer preferences are increasingly shaping regulatory frameworks governing food supply chains. From a strategic management perspective, numerous fragmented initiatives address distinct dimensions of fairness, such as prioritizing enhanced environmental performance or ensuring equitable returns for producers (Asioli et al., 2020). According to Del Prete et al., (2025), there are a predisposition toward fairness to enhances the affective experience associated with consumption, which subsequently strengthens consumer commitment to fair trade products.

Based on the findings of Samoggia and Beyhan (2022), the implementation of fair and ethical practices throughout the agri-food supply chain constitutes a fundamental prerequisite for achieving sustainability and resilience. Mechanisms that promote fairness, such as prohibiting unfair trading practices, ensuring equitable remuneration for producers, and enhancing transparency through technological solutions, serve to reinforce both upstream and downstream relationships. These interventions could help strengthening the bargaining power of farmers and build consumer trust; thereby mitigating opportunistic behaviours and operational inefficiencies that frequently result in food loss and waste.

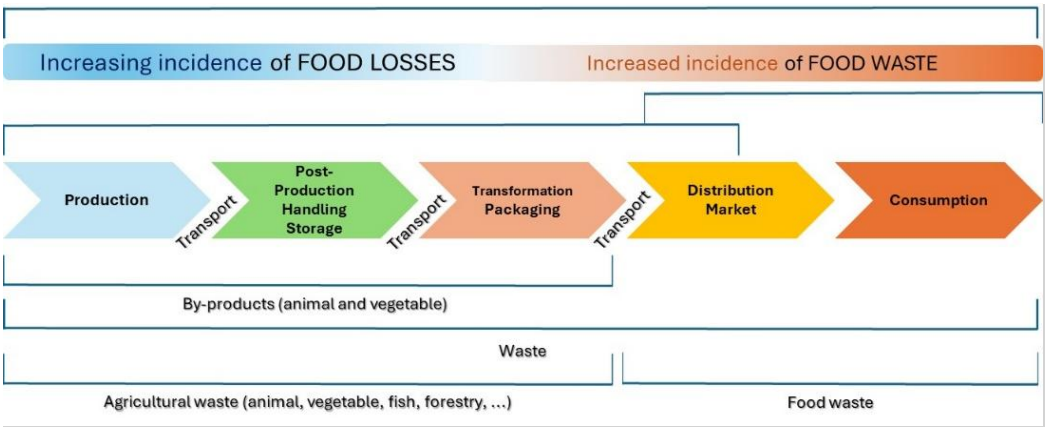
2.3 Food Waste and Loss in Agrifood Systems

Food waste occurs at multiple stages of the supply chain, from production and processing to distribution and consumption. According to Amicarelli and Bux (2021), measuring food waste is essential for designing fair, healthy, and environmentally friendly food systems.

Cristóbal et al., (2018) propose prioritizing sustainable measures for food waste prevention, including improved logistics, consumer education, and policy interventions. Similarly, Costello et al. (2016) highlight the environmental impact of food waste in institutional settings, such as schools and universities, where both pre- and post-consumer waste contribute significantly to emissions.

Food loss and food waste have been mentioned as different concepts, nevertheless, both representing supply agri-food systems inefficiency (FAO, 2013, a). As presented in Figure 2, food loss primarily arises during the early phases, production, post-harvest, and processing, and is largely attributable to systemic inefficiencies in the food production and distribution network. These inefficiencies often stem from managerial and technical constraints, including inadequate storage facilities, insufficient cold chain infrastructure, poor handling practices, limited packaging solutions, and underdeveloped marketing systems. Institutional and policy shortcomings further exacerbate these challenges, creating structural vulnerabilities that lead to significant losses before food reaches the market (Food loss and waste. Nat Food 5, 2024).

Figure 2. Food Waste and Loss.



Source. Adapted from PERDA (2025).

According to Food Waste Report of the United Nations Environment Programme (UN, 2024), food waste represents failures at several levels: i) market: more than 1 trillion USD of food is thrown away every year, ii) environmental: it is estimated that food waste generates between 8-10% of global greenhouse gas emissions (including from both loss and waste), and it takes up the

equivalent of 30% of the world's agricultural land, iii) society: while food is being thrown away at a large scale, up to 783 million people are affected by hunger each year, and 150 million children under the age of five suffer from hindered growth and development due to a chronic lack of essential nutrients in their diets. It is, therefore, pivotal to implement effective measures to reduce food waste and recover food residues.

3. METHODOLOGY

3.1 Delphi Technique

The Delphi method was considered for its ability to generate expert consensus on complex, future-oriented topics. As described by Brockhoff (1975) and Powell (2003), the technique involves iterative rounds of questionnaires, allowing experts to refine their views based on group feedback. The Delphi method has been widely used to explore future developments in agrifood systems (Mili & Bouhaddane, 2021; Toppinen et al., 2017). It is a technique is structured as a systematic group communication process designed to achieve convergence of expert opinions on a specific real-world issue. This iterative procedure has been applied across diverse fields, including program planning, needs assessment, policy formulation, and resource allocation, to generate comprehensive alternatives. The Delphi method is particularly suited for consensus-building, employing successive rounds of questionnaires administered to a panel of selected experts, with controlled feedback mechanisms to refine responses and enhance reliability (Hsu & Brian, 2007). Defined as 'a structured communication process enabling a group to collectively address complex problems' (Linstone & Turoff, 1975, p. 3), Delphi serves as a systematic approach for eliciting expert insights on specific topics to inform decision-making (Dalkey & Helmer, 1963). Its application spans diverse scientific domains, including technology and education (Cornish, 1997), and it is recognized as a long-term forecasting technique grounded in the aggregated expertise of a panel (Gupta & Clarke, 1996). Historically, the term originates from the ancient Greek oracle of Delphi, symbolizing foresight and advisory functions (Gupta & Clarke, 1996). According to Fowles (1978), the original Delphi process is characterized by three core principles: structured information flow, iterative feedback, and participant anonymity, all of which were adhered to in this study. Regarding procedural design, Fowles (1978) delineates ten critical steps: (i) assembling and training a research team; (ii) selecting expert panels; (iii) developing the initial questionnaire; (iv) pre-testing for clarity and precision; (v) administering the first round; (vi) analysing responses;

(vii) preparing and refining subsequent rounds; (viii) distributing follow-up questionnaires; (ix) synthesizing second-round data; and (x) reporting final conclusions.

Recently, the Delphi method was used in the agri-food sector to expand new ideas and innovative products. Studies such as (Zickafoose, A, 2022) demonstrates the applicability of the Delphi regarding the understanding and forecasts food innovations, that will be available to consumers on the future.

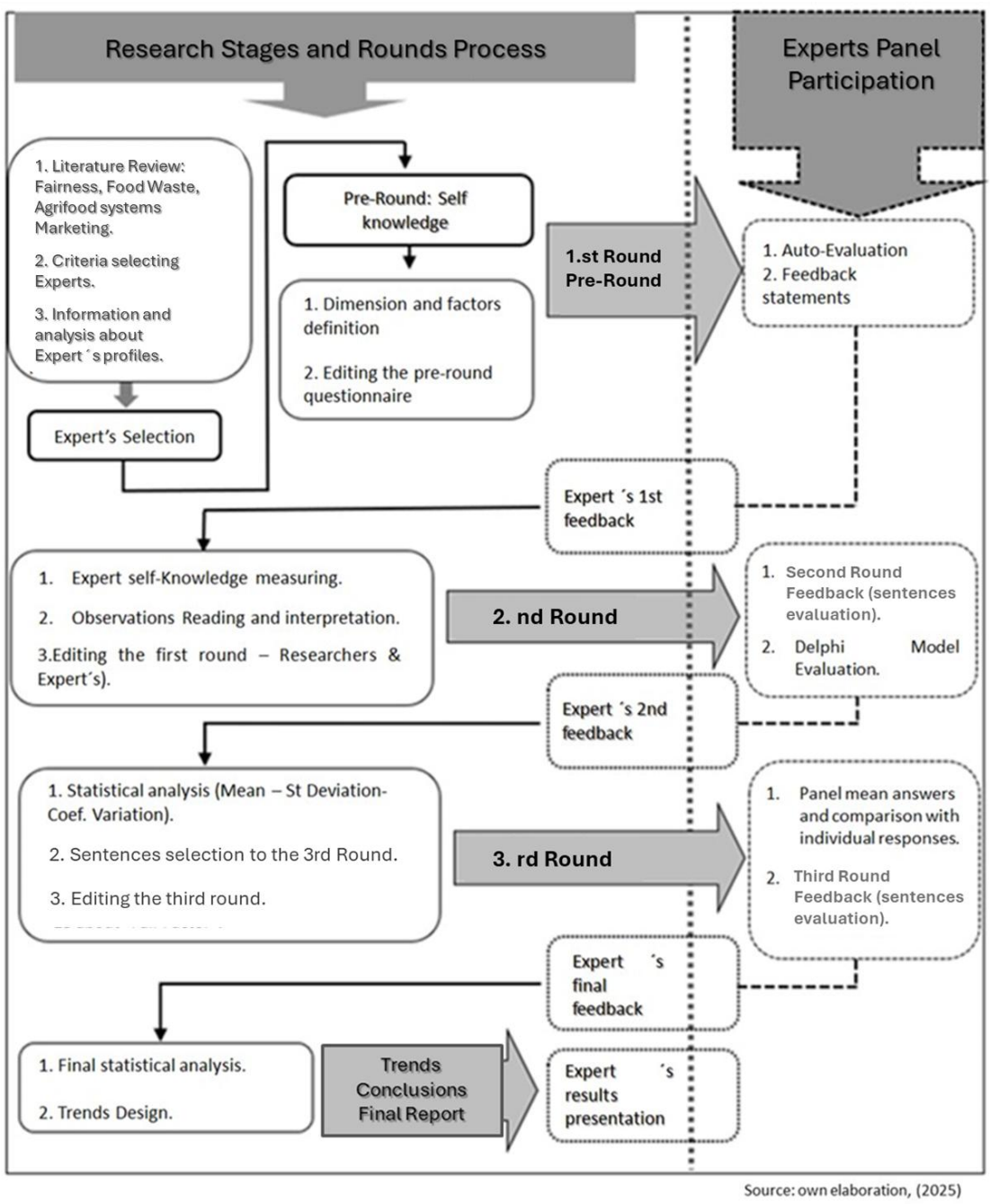
3.2. Panel selection criteria

As previously noted, there is no universally prescribed size for a Delphi expert panel; however, Brockhoff (1975) demonstrated that panels comprising as few as four members can yield reliable outcomes. Powell (2003) emphasizes that panel representativeness depends more on the quality of expertise than on numerical size. In this study, three criteria guided panel selection: (i) professional background and relevant experience; (ii) familiarity with the contextual agri-food environment; and (iii) direct or indirect involvement in the agri-food sector. The final composition included experts from all three sectors recommended in Delphi literature: 62.5% from the private sector, 25% from academia, and 12.5% from public institutions. Each participant's profile was rigorously assessed, resulting in a panel of 24 national experts, including 15 experts from private sector, 6 from academia, and 3 from public institutions.

3.3. Delphi Procedures

This research employed a three-round Delphi: pre-round, second round and third round. In Figure 3, the research roadmap is presented and clarified. An initial pre-round was conducted to: i) assess each expert's level of knowledge regarding a predefined set of statements, and ii) capture additional perspectives and insights from participants. This step enabled the incorporation of new point of views into subsequent rounds.

Figure 3. Delphi Research Roadmap



Source. Own elaboration (2025)

Expert judgments were evaluated using a five-point Likert scale to measure agreement with the perceived likelihood of specific events occurring between 2017 and 2027 (ten years forecasting) (ranging from 1 = 'extremely unlikely' to 5 = 'extremely likely'). As noted by Corbetta (2007), this scale is appropriate for attitude measurement due to its simplicity. Quantitative analysis of

responses, including mean, standard deviation (SD), and coefficient of variation (CV) were conducted using descriptive statistics. Following Toppinen et al. (2017), such measures are commonly applied in Delphi studies to determine response distribution and assess consensus. In this research, the mean was used to identify the central tendency of opinions. A stopping criterion was defined based on consensus level. Two dispersion indicators were considered: SD and CV. While Delphi literature often accepts CV ≤ 0.50 as indicative of consensus (Milli & Zúñiga, 2001), this study adopted a stricter threshold, defining consensus as CV ≤ 0.31 (Pestana & Gageiro, 2020). To evaluate response stability, changes in CV across rounds were monitored, as recommended by Mili and Bouhaddane (2021). Statements with insufficient consensus were reintroduced in subsequent rounds for re-evaluation. Table 3 presents the value ranges applied to assess consensus and guide decisions regarding continuation to further rounds.

Table 3. Research Consensus Degree

Range of Coefficient of variation	Level of Consensus	Rounds Acceptance Decision
CV ≤ 0.15	High degree of consensus	Accepted 1.st Round
0.16 <CV ≤ 0.3	Medium degree of consensus	Rejected - 2.nd Round
0.31 <CV ≤ 1	Low degree of consensus	Rejected 1.st Round

Source. Own elaboration (2025).

The original Delphi questionnaire was designed to understand all the supply and demand chain, regarding the trends to the Portuguese agrifood industry, 2017-2027. For that, the research was made based on 96 variables. For this specific topic, food waste, only two variables were selected for analysis in this paper.

In this study, the initial pre-round aimed to assess self-perceived expertise and gather feedback on the clarity and completeness of the survey statements. Experts were invited to indicate whether the statements provided new insights, suggest additional information, or propose revisions to address any ambiguities. The first round focused on evaluating the level of consensus and identifying areas of divergence among expert opinions. In the second round, participants were asked to compare their views with the panel's average responses and provide further justification or elaboration,

particularly in cases where their opinions significantly deviated from the group norm. The overall objective was to assess the feasibility of two projected scenarios for the year 2027.

4. RESULTS

Table 4 presents the descriptive statistics (mean, standard deviation, and coefficient of variation) that served as the basis for determining the consensus level concerning the two statements assessed by the panel of experts.

Table 4. Sentences Analysed.

Model Dimension	Factor	Sentences - Variables	Statistics Measures	2.ª Round	3.ª Round
FAIRNESS	FACTOR 1 GOVERNANCE POLICIES	By 2027, all Portuguese public and private schools will be supplied primarily by local producers (from the region where the school is located) and certified in sustainable production methods.	* $\bar{x}$	4.2	4.2
			** σ	1 ↓	0.9
			*** *CV*	23.8% ↓	**21.4%**
		By 2027, food waste in Portugal will be reduced to 15% of national production.	$\bar{x}$	4.4	4.4
			σ	0.7 ↓	0.6
			CV	15.9 ↓	**13.6**

Notes: *Mean; **Standard Deviation; ***Coefficient of Variation.

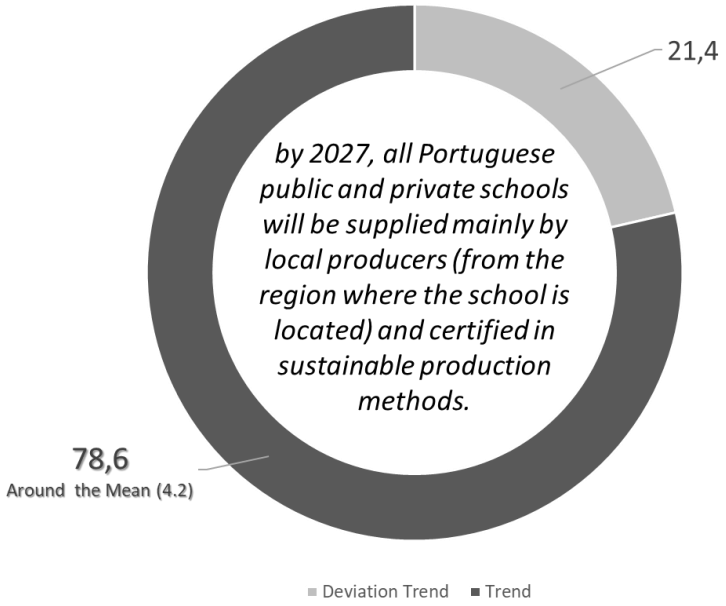
Source. Own elaboration (2025).

Referring to Table 4, when comparing the second with the third-round, both sentences got less standard deviation. Furthermore, as it was expected the coefficient of variation decrease, which is one of the goals of this Delphi methodology: from divergent to convergent opinions without external influence. The first sentence, "By 2027, all Portuguese public and private schools will be supplied primarily by local producers (from the region where the school is located) and certified in sustainable production methods" achieved a CV of 23.8%. After repeating the procedure by returning the sentence average to the panellists, on the third round the standard deviation falls from 1 to 0.9 and a CV was 21.4%. These indicators suggest moderate consensus, but stronger and above all feasibility, regarding the possibility to supply the Portuguese school's majority with local

producers certified in sustainable productions. Nevertheless, some Experts cited five constraint factors to achieve this goal: i) regional agricultural capacity, ii) existing certification frameworks for sustainable production, iii) policy momentum toward local procurement, iv) challenges included in logistical coordination and budget constraints, to supply schools and v) negotiation process with public sector to change the business status quo in this "market", schools food.

As illustrated in Figure 4, there is strong possibility of achieving trend, regarding the variable in analysis.

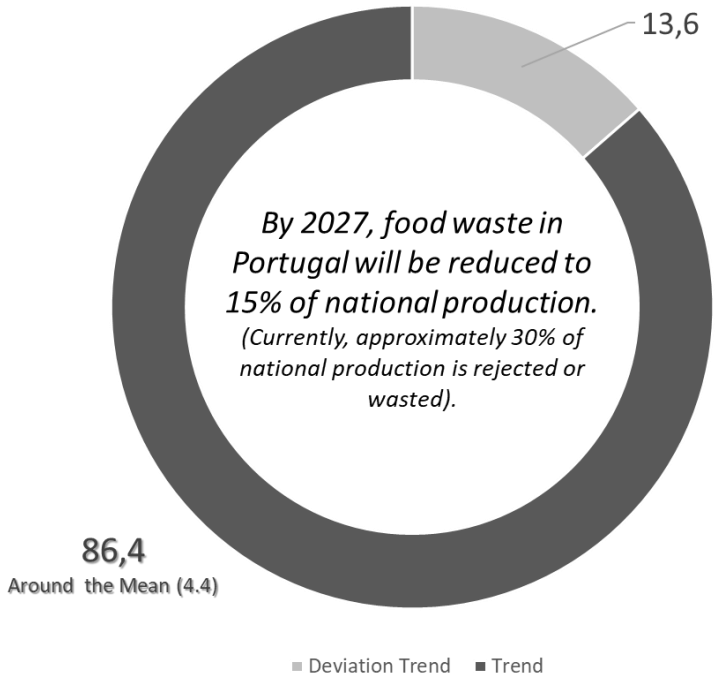
Figure 4. Trend 1.



Source: Own elaboration (2025)

The second trend - Figure 5, was a projection rated more favourably, as the statistics indicators demonstrated.

Figure 5. Trend 2.



Source. Own elaboration (2025)

5. DISCUSSION

5.1 Fairness as a Strategic Factor Decision

The findings underscore the importance of fairness dimension, not only as public police to implement, but also as a marketing strategy in the agrifood sector, in achieving food waste reduction. Fairness facilitates trust, cooperation, and long-term commitment among stakeholders. In SCM, fairness can manifest through transparent pricing mechanisms, equitable access to markets and inclusive decision-making processes in agrifood industry. These elements could contribute to more resilient and efficient supply chains, reducing waste and enhancing sustainability.

5.2 Fairness Policy Implications

The Delphi panel's support for local sourcing and waste reduction suggests that targeted policies can be effective. Potential policy measures should include: i) Promoting and engaging in local food procurement programs for institutional settings, such as schools; ii) Providing subsidies or tax incentives for producers and firms pursuing sustainable certifications; iii) Implementing regulatory measures or penalties for excessive food waste across the supply chain links. Comparative studies could provide further insights into best practices from similar agrifood contexts. In practice, such measures are likely to be financed through a combination of public

procurement budgets, national sustainability programmes, and EU-level funding instruments supporting agri-food transitions.

Public strategies that aim to embed fairness within agri-food systems are increasingly promoted advancing sustainability, social equity, and economic resilience. However, the literature consistently shows that the translation of fairness principles into effective public action entails substantial institutional, economic, and governance challenges. These challenges have direct implications for policy performance, legitimacy, and long-term effectiveness (Barling et al., 2022). Despite its central role in European and international agri-food policy discourse, fairness remains a contested and multidimensional concept, encompassing distributive, procedural, and interactional dimensions (Busch & Spiller, 2016; Samoggia et al., 2023). This lack of a unified definition complicates policy design, as different actors—farmers, processors, retailers, and consumers - interpret fairness through divergent normative and economic lenses. As a result, public interventions risk addressing only partial dimensions of fairness, thereby limiting their systemic impact and generating fragmented policy outcomes.

Fairness-oriented public strategies face strong structural constraints related to power asymmetries and market concentration in agri-food value chains. Empirical studies demonstrate that dominant downstream actors, particularly large retailers, retain substantial bargaining power that is only weakly affected by regulatory interventions (Barling et al., 2022; Meemken et al., 2021).

Nevertheless, achieving the objectives outlined in the two statements; specifically, whether by 2027 the Portuguese agri-food system can adapt to ensure that most schools are supplied by local producers using certified products, and whether food waste can be reduced by 15% across the food chain, requires substantial improvements in the current functioning of the national agri-food system, coupled with strong governmental commitment. Furthermore, significant consumer engagement is essential, as household food waste remains the most critical challenge to address in this context.

5.3 Fairness implications as marketing strategy

The adoption of marketing strategies grounded in fairness principles presents significant opportunities for value creation in the agri-food sector. However, their effective implementation entails substantial structural, operational, and strategic challenges. Fairness-oriented marketing requires firms to move beyond symbolic communication and to align market narratives with concrete supply-chain practices, governance mechanisms, and cost structures. This alignment

introduces a series of hard implications that directly influence organizational performance and competitiveness.

Agri-business practitioners can leverage advanced digital technologies to improve supply chain efficiency and ensure fair practices. The theoretical contributions include a deeper understanding of the interconnectedness of food security, technology and policy, highlighting the necessity of an integrated approach to address systemic inequities. Governments and some companies are increasingly focused on incentives and networks that target the delivery of more productive and sustainable food systems as well as more focused land management strategies. Enhanced communication, connectivity and improved cross-sectoral/departmental interactions among stakeholders, researchers, funders and policymakers are vital to realizing opportunities. (Onyeaka, H., Et al, 2024).

There are a major implication lies in the cost–performance trade-off inherent to fairness strategies. Ensuring fair pricing, equitable value distribution, and transparent contractual relationships frequently increases production, procurement, and coordination costs, particularly in supply chains dominated by small-scale producers and fragmented upstream actors. From a marketing perspective, the ability to transfer these additional costs to consumers through price premiums is highly uncertain and market-dependent. While a segment of consumers expresses willingness to pay for fairness-related attributes, price sensitivity remains high for staple food products, limiting the scalability of fairness-based differentiation strategies. As a result, firms face a structural tension between maintaining economic performance and sustaining fairness commitments over time.

6. LIMITATIONS AND FUTURE RESEARCH

This study is limited to the Portuguese agrifood sector. Future research should compare these findings with other countries that have similar agricultural structures. Additionally, incorporating perspectives from food retail managers could enrich the analysis, especially regarding operational challenges and consumer behaviour. Furthermore, a mixed-methods approach combining Delphi with case studies or ethnographic research could provide deeper insights into the lived experiences of stakeholders.

7. CONCLUSION

Fairness in agrifood systems is not merely a moral imperative, it is a strategic necessity. By fostering equitable relationships and inclusive governance, fairness can drive meaningful reductions in food waste. Our Delphi study indicates that Portugal is on track to achieve significant progress by 2027, particularly in local sourcing for schools and reducing food waste to 15% of national production.

These findings offer a roadmap for policymakers, industry leaders, and civil society to collaborate toward a more sustainable and just agrifood future.

Considering the environmental Impacts of Fairness-Driven Food Waste Reduction, the reduction of food waste in Portugal from 17% to 15% of national production, as projected by the Delphi panel, could lead to measurable reductions in carbon emissions. Costello et al. (2016) estimated that food waste in institutional settings contributes significantly to embodied greenhouse gas emissions. By sourcing food locally and minimizing waste, schools and other institutions can reduce transportation-related emissions and the energy used in food production and storage.

Fairness in SCM also promotes sustainable farming practices, which tend to have lower environmental impacts. Certified sustainable producers often use fewer synthetic inputs, conserve water, and maintain soil health, contributing to long-term ecological resilience.

Additionally, food production is resource-intensive, requiring vast amounts of water, land, and energy. When food is wasted, these resources are also lost. Cristóbal et al. (2018) emphasize the importance of optimizing resource use through waste prevention strategies. Fairness-driven policies that prioritize local and sustainable sourcing inherently support resource efficiency by shortening supply chains and reducing dependency on industrial agriculture.

Moreover, equitable access to resources encourages small-scale producers to adopt environmentally friendly practices, knowing they will be fairly compensated and supported through policy frameworks.

Regarding agricultural practices linked to fairness, such as crop diversification, agroecology, and reduced chemical use, they can enhance biodiversity. Local sourcing for schools, as projected in this study, may incentivize regional producers to maintain diverse and resilient ecosystems. This contrasts with monoculture systems that often degrade soil and reduce habitat availability for native species.

Reducing food waste also lessens the pressure to overproduce, which is a common cause of habitat destruction and biodiversity loss. By aligning production with actual consumption needs, fairness-based SCM contributes to more balanced and sustainable land use.

According to the FAO (2013, b), food wastage contributes to approximately 8 - 10% of global greenhouse gas emissions, making it a significant driver of climate change. The environmental footprint of wasted food includes greenhouse gas emissions, water and land use, and biodiversity loss. It can be concluded that food waste is not only a socio-economic issue but also a major environmental concern. Hence, the Fairness dimension as a pillar in agrifood systems, could also support the axes of the circular economy, where waste is minimized and resources are reused. Food waste reduction strategies often include redistribution, composting, and biogas production. These practices not only reduce environmental harm but also create new economic opportunities, especially for marginalized communities.

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