Mix Sustentável

Sustainable Strategies in Food Service in Brazil: trends and perspectives — an integrative review

Estratégias Sustentáveis em Serviços de Alimentação no Brasil: tendências e perspectivas — uma revisão integrativa

Estrategias Sostenibles en Servicios de Alimentación en Brasil: tendencias y perspectivas — una revisión integradora

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Resumo: O crescimento do setor de Serviços de Alimentação no Brasil intensificou a geração de resíduos ao longo do processo produtivo, evidenciando a necessidade de práticas sustentáveis. Este estudo teve como objetivo analisar estratégias para a redução de resíduos e a promoção da sustentabilidade em Serviços de Alimentação industriais, institucionais, hospitalares e comerciais no Brasil. Realizou-se uma revisão integrativa da literatura com abordagem comparativa, incluindo artigos de pesquisa originais publicados entre 2015 e 2025 que abordavam práticas sustentáveis no setor. A busca bibliográfica foi conduzida nas bases SciELO, LILACS e Google Acadêmico, utilizando palavras-chave relacionadas à sustentabilidade, desperdício, resíduos e categorias de Serviços de Alimentação. Artigos de revisão foram excluídos. Os resultados indicaram que as estratégias mais comuns incluíam a gestão de resíduos, o uso eficiente da água e o apoio à agricultura familiar. As unidades comerciais enfatizaram práticas operacionais e a conformidade com especificações técnicas, enquanto as unidades hospitalares e institucionais concentraram-se mais na economia circular e no Aproveitamento Integral dos Alimentos. Foram identificadas lacunas na adoção de soluções estruturais e tecnológicas, particularmente no que se refere a energias renováveis. A gestão estratégica e a integração entre planejamento e execução são fundamentais para avançar nas práticas sustentáveis, melhorar a eficiência econômica e fortalecer a responsabilidade socioambiental no setor brasileiro de Serviços de Alimentação.

Palavras-chave: Serviços de Alimentação; Desperdício; Resíduos; Desenvolvimento Sustentável

Abstract: The growth of the food service sector in Brazil has increased waste generation throughout the production process, highlighting the need for sustainable practices. This study aimed to analyze strategies for reducing waste and promoting sustainability in industrial, institutional, hospital, and commercial food services in Brazil. An integrative literature review with a comparative approach was conducted. Original research articles published between 2015 and 2025 addressing sustainable practices in food services were included. The literature search was conducted in SciELO, LILACS, and Google Scholar using keywords related to sustainability, waste, residues, and food service categories. Review articles were excluded. The results showed that the most common strategies included waste management, efficient water use, and support for family farming. Commercial units emphasized operational practices and compliance with technical specifications, whereas hospital and institutional units focused more on the

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SLSS: conceptualization, investigation, methodology, data curation, formal analysis, and writing – original draft. GVC: visualization, drafting – original draft, and drafting – revision and editing. TKSP: data curation, writing – revision and editing. MGS: Data curation and validation. LKRS: conceptualization, data curation, methodology, validation, supervision, and writing – review and editing.

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circular economy and comprehensive food utilization. Gaps were identified in the adoption of structural and technological solutions, particularly renewable energy. Strategic management and the integration of planning and execution are essential to advance sustainable practices, improve economic efficiency, and strengthen socio-environmental responsibility in the Brazilian food service sector.

Keywords: Food Services; Waste; Residues; Sustainable Development.

Resumen: El crecimiento del sector de servicios de alimentación en Brasil ha incrementado la generación de residuos a lo largo de todo el proceso productivo, lo que pone de relieve la necesidad de implementar prácticas sostenibles. Este estudio tuvo como objetivo analizar estrategias para reducir los residuos y promover la sostenibilidad en los servicios de alimentación industriales, institucionales, hospitalarios y comerciales en Brasil. Se llevó a cabo una revisión integradora de la literatura con un enfoque comparativo, incluyendo artículos de investigación originales publicados entre 2015 y 2025 que abordan prácticas sostenibles en servicios de alimentación. La búsqueda bibliográfica se realizó en SciELO, LILACS y Google Scholar, utilizando palabras clave relacionadas con la sostenibilidad, los residuos, los desechos y las categorías de servicios de alimentación. Se excluyeron los artículos de revisión. Los resultados mostraron que las estrategias más comunes incluyen la gestión de residuos, el uso eficiente del agua y el apoyo a la agricultura familiar. Las unidades comerciales hicieron hincapié en las prácticas operativas y el cumplimiento de especificaciones técnicas, mientras que las unidades hospitalarias e institucionales se centraron más en la economía circular y el aprovechamiento integral de los alimentos. Se identificaron carencias en la adopción de soluciones estructurales y tecnológicas, particularmente en lo que respecta a las energías renovables. La gestión estratégica y la integración entre la planificación y la ejecución resultan fundamentales para avanzar en la adopción de prácticas sostenibles, mejorar la eficiencia económica y fortalecer la responsabilidad socioambiental en el sector brasileño de servicios de alimentación.

Palabras clave: Servicios de alimentación; Residuos; Desechos; Desarrollo sostenible.

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1 1 INTRODUCTION

Food services are management units responsible for the technical and administrative activities of meal production, from acquisition to distribution, with the aim of maintaining, improving, or restoring the health of those served and promoting healthy eating habits (Conselho Federal de Nutricionistas, 2018). They are classified as industrial, institutional (such as university restaurants, school kitchens, and prison kitchens), hospital, and commercial units (Conselho Federal de Nutricionistas, 2018; Colares et al., 2018).

Each category has a distinct purpose. Industrial services provide balanced meals that promote workers' health and safety, reduce accidents, and enhance attendance and productivity (Ribeiro, 2002; Caobianco, 2015). Institutional services offer convenience and, in universities and schools, support learning and quality of life (Oliveira et al., 2016). Hospital services supply patients, personnel, visitors, and companions to maintain or restore health (Mezomo, 2015), whereas commercial restaurants operate on a first-come, first-served basis (Proença et al., 2005).

Although the sector has grown significantly in Brazil, this expansion often generates unregulated waste, with environmental impacts such as degradation of wildlife and plant life, atmospheric deterioration, and intensification of climate change (Colares et al., 2018). Current practices of food production, distribution, and consumption are unsustainable, and agricultural enterprises, despite their essential role, can greatly affect the environment (Silva et al., 2022).

Studies also indicate considerable waste along Brazil's food production chain (Betz et al., 2015; González et al., 2017; Zaro, 2018), alongside increased household food insecurity, particularly in rural areas and among families living in poverty, which contributes to social inequality (Valadares; Alves, 2023).

In response, sustainable development has gained global importance, based on meeting the needs of the current generation without compromising those of future generations, which requires integrating sustainability into all stages of production (Machado et al., 2021). The United Nations (UN) 2030 Agenda, published in 2015 with 17 Sustainable Development Goals (SDGs), requires food service companies to adjust their processes and tackle food waste, a measure vital for combating hunger (BRASIL, 2021).

Adopting sustainable strategies is particularly crucial given the impact of these units across the food supply chain and the high demand for inputs, energy, and water to produce meals for large groups (Carino et al., 2020). Thus, the objective of this study was to review trends and insights regarding sustainable strategies applied in food services in Brazil.

2 METHODOLOGY

This study was conducted through a descriptive literature review using a comparative approach to examine the adoption of sustainable practices in industrial, institutional, hospital, and commercial food services. The review followed six stages: (1) identifying the topic and formulating the research question; (2) esta-

blishing inclusion and exclusion criteria; (3) defining the information to be extracted from the selected studies; (4) evaluating the included studies; (5) interpreting the results; and (6) presenting the review and synthesis of knowledge.

Studies were included if they were original research articles published between 2015 and 2025 and addressed sustainable practices in food services. The analysis focused on actions to reduce waste during the food production process and strategies adopted to promote sustainability in these settings. Review articles, monographs, and doctoral theses were excluded.

The literature search was conducted using the SciELO and LILACS databases, Google Scholar, and electronic journals. The search terms included sustainability, waste, residues, and industrial, hospital, commercial, and institutional food services. The search strategy considered the application of sustainable practices across the different categories of food services investigated.

Data collection involved reading the abstracts of articles that met the inclusion criteria and addressed the study objectives. Information from the selected studies was organized into a table containing the article title, authors, year of publication, objectives, methods, main findings, and sustainable strategies adopted by food services to reduce waste and promote sustainability throughout the food production process.

The findings were organized into tables and graphs to facilitate comparison among the categories of food services. The discussion was structured around the sustainable strategies and practices identified in the selected studies.

3 RESULTS AND DISCUSSION

Most studies conducted in Brazilian establishments have evaluated food services in isolation, reflecting a limited understanding of practices aimed at reducing environmental impacts in the sector. Table 1 therefore presents a comparative perspective on the sustainable actions implemented in industrial, institutional, hospital, and commercial units, whose distinct demands require different approaches.

Table 1 – Adoption of sustainable practices in Brazilian food services by category (2015–2025)

Category	Author(s) / Year	Sustainable practices adopted
Industrial	Zão et al. (2020)	Temperature measurement at goods receipt by trained personnel, using an appropriate thermometer; calculation of the percentage of food waste and leftovers; separation and storage of recyclables for selective collection; nutritionist training employees in sustainable development; purchase of food from local producers
	Mariosa and Alves (2019)	Acceptable rest-intake (average per capita = 22.04 g/person/day); satisfaction level of 93.2%; daily collection and donation of food waste for animal fodder; collection of non-food waste for recycling and reuse

Table 1 (Continuation)

Category	Author(s) / Year	Sustainable practices adopted
	Alves and Ueno (2015)	Acceptable volume of solid waste (average per capita = 0.177 kg/person/day), 85% organic and 15% recyclable and non-recyclable; organic waste sent for composting, recyclables collected by a specialized company, non-recyclables sent to landfill
Institutional	Barata et al. (2025)	Meat monitoring (spreadsheets and correction factors); regulated disposal (waste management via third parties); by-product use (sausage and burger production); technical training (pre-preparation and butchery skills)
	Rabelo et al. (2022)	Menu acceptability rates > 70% (satisfactory); acceptable food waste intake (average per capita = 39.2 g/person/day); implementation of an anti-waste campaign
	Chagas et al. (2021)	Menu evaluation (84.5% overall quality, daily monitoring); acceptability (85.9%–97.4%); waste metrics (7.3% leftovers, 64.1 g per capita); production volume (628 kg/day supply; 221.9 kg/day leftovers)
	Spinelli et al. (2020)	Full use of raw materials; waste analysis (30.7% loss in post-production and leftovers); customer volume evaluation per period; composting (local/third-party); recycling of paper, glass, and metals; oil collection by third party (12.5 L/week)
	Betz et al. (2015)	Waste vs. satisfaction: Company A (202 kg/day; 57.1% satisfaction) and Company B (321 kg/day; 71.7% satisfaction); proposed application of waste reduction measures in both units
	Araújo and Carvalho (2015)	Fluorescent lamps and selective collection; proper oil disposal and organic waste for animal feed; nutritionist with eco-training and menu planning; reuse of clean leftovers; waste metrics (total 776 kg; organic 568.3 kg; inorganic 207.6 kg; oil 17.6 kg)
Hospital	Baía et al., 2025	Full utilization of food and surplus donation; daily waste tracking and visual displays; equipment protocols and water sensors; purchase of biodegradable products; reusable cups for staff/patients; sustainability workshops for handlers; recycling and material donation partnerships
	Silva et al. (2022)	Training nutritionists and employees on sustainable practices; proper portioning; analysis of food waste and use of clean leftovers; menu planning with seasonal foods; raising diners' awareness about water and energy use
	Luduvice et al. (2020)	Training handlers on conscious water and energy consumption; seasonal foods with full utilization in menu planning; temperature control of ingredients; selective collection and proper handling of used oils

Table 1 (Continuation)

Category	Author(s) / Year	Sustainable practices adopted
	Melo and Strasburg (2020)	Purchase of minimally processed vegetables (more advantageous than fresh produce): reduced energy, water, and sanitizing product consumption; use of seasonal products
	Santos et al. (2019)	Regional and seasonal foods; thawing under refrigeration; monitoring of food waste and clean leftovers; separation and collection of waste and oil by the municipal collection company
Commercial	Souza et al. (2025)	Resource management (water, energy, gas); technical data sheets; local products; seasonal products on the menu; limited packaging and bulk products; separation of recyclables; cleaning concentrates and dilution control systems; avoiding/minimizing disposables; environmental training for staff
	Nichele et al. (2023)	Employee awareness on water and energy use, food waste monitoring, trash separation; rainwater storage for toilets;
	Santiago, Ramos and Batista (2022)	waste and oil collection by third party; seasonal and regional foods from family farms; LED bulbs and cold room alarms Awareness among handlers and customers; planned menu with technical data sheets, seasonal/regional foods, and full utilization; LED lamps, solar panels, and combination ovens; monitoring of leftovers and correction factors; satisfactory daily leftover percentage; selective collection, with organic waste sent for specialized composting
	Molloy et al. (2022)	Operational procedures to reduce plastics; continuing education for employees and diners; reusable products; exchange programs (takeout or bulk containers); 100% plant-based biodegradable alternatives
	Góis et al. (2019)	Precise meal forecasting to minimize waste and engage staff; eco-efficient technologies with employee awareness; specialized collection of recyclables and oil, with strategic packaging use
	Ribeiro and Pinto (2018)	Reduced water and energy consumption; sustainable procurement (organic, seasonal, biodegradable); recycling of solid materials and repurposing of organic waste for feed
	Gonçalves et al. (2018)	Technical sheets and temperature monitoring to minimize losses; family farming and full utilization of ingredients; employee training in resource conservation and standardized waste procedures

Table 1 (Conclusion)

Category	Author(s) / Year	Sustainable practices adopted
	Siqueira and Carvalho (2018)	Production optimization via diner tracking and seasonal menus; reduced leftovers through food reuse and replacement; conversion of organic waste into feed and oil into soap; staff training on conscious water, paper, and energy use
	González et al. (2017)	Baseline: high average leftovers (28.4%); intervention: menu optimization, resized production and serving dishes, improved buffet labeling; result: total leftovers reduced to 20.2%

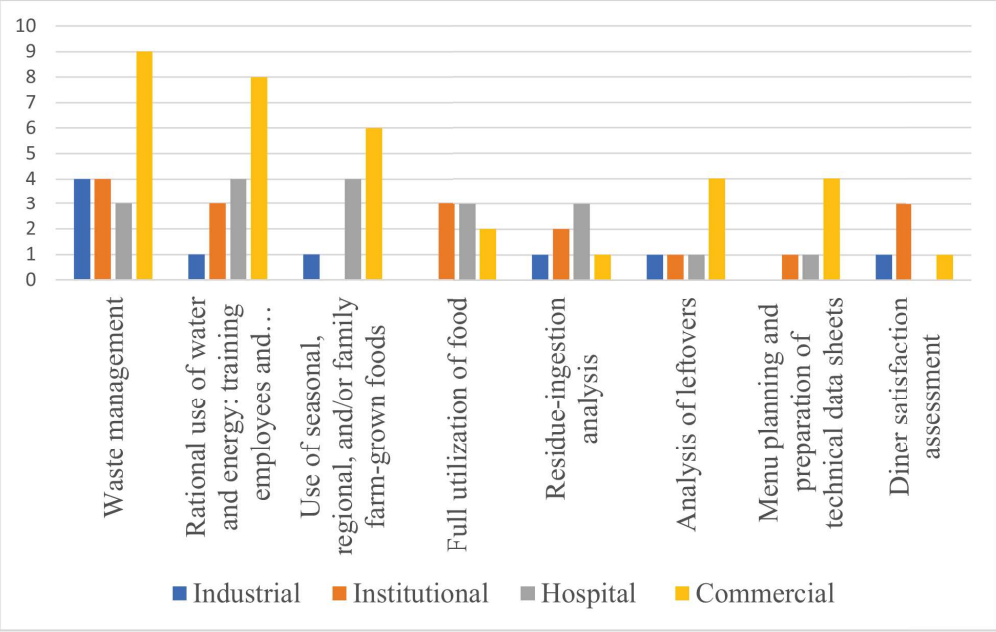
Source: survey data.

Managers are increasingly attentive to sustainability, although practices vary across sectors. According to Figure 1, the most common actions were waste management in industrial services, satisfaction assessment in institutional services, seasonal, regional, and family-farm foods in hospital services, and efficient water and energy use, employee training, and diner awareness in commercial services.

Of the 23 articles analyzed, 20 (86.9%) addressed waste management, 16 (69.5%) dealt with water and energy use, employee training, and diner awareness, and 11 (47.8%) explored seasonal, regional, and/or family-farm foods. Other strategies appeared in lower proportions (Figure 2).

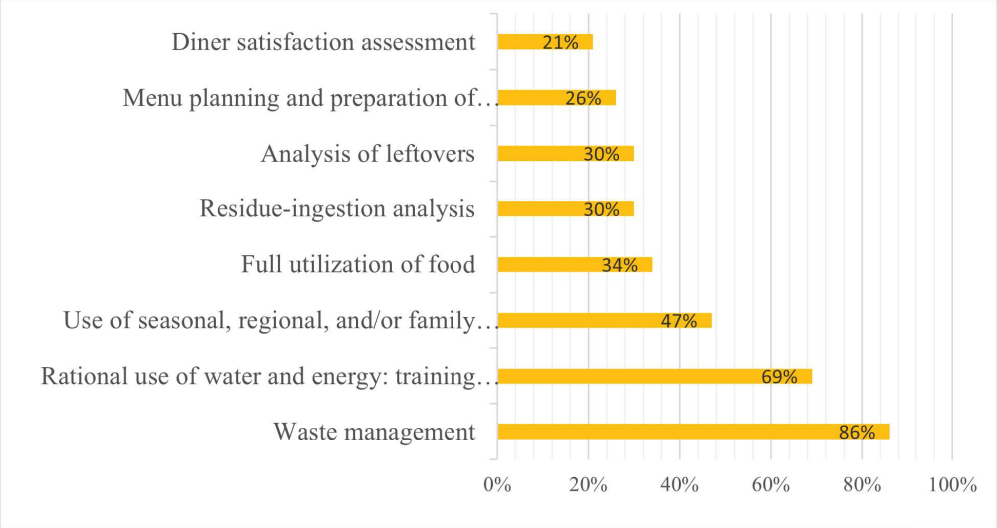
Given this diversity, the discussion is organized in topics by type of action: waste management, water and energy use, seasonal, regional, and family-farm foods, full food utilization, residue-ingestion, leftovers, menu planning and technical data sheets, and diner satisfaction. In each topic, findings are compared among the four types of food services.

Figure 1 – Most common sustainable actions adopted in different Food Services.



Source: survey data.

Figure 2 – Percentage of studies that addressed the most commonly adopted sustainable practices in industrial, institutional, hospital, and commercial food services.



Source: survey data.

3.1 Waste management

Proper solid waste management involves reuse, recycling, composting, energy recovery, and safe final disposal to prevent harm to public health and the environment (Brasil, 2010), as well as reducing waste generation and promoting awareness and reuse (Brasil, 2022). Souza et al. (2025) found that commercial food services separate recyclables (78.6%), limit packaging and buy in bulk (85.7%), avoid disposables (78.6%), and reduce plastic use (71.5%).

Góis et al. (2019) and Santos et al. (2019) identified selective collection of used cooking oil and recyclables in commercial and hospital settings (Table 1), which is essential to reuse inorganic materials and prevent landfill overload (Baía et al., 2025). Waste must be stored, separated and identified, outside the unit to prevent food contamination (Brasil, 2004), and identifying its main sources and using biodegradable cleaning products are recommended (Harmon; Gerald; American Dietetic Association, 2007).

Melo and Strasburg (2020) found that fresh foods generated more waste than minimally processed vegetables in a hospital unit, and Alves and Ueno (2015) reported a per capita daily generation of 0.177 kg in an industrial unit (UAN) (Table 1). Despite their higher cost, minimally processed vegetables save time and reduce waste and water consumption (Nascimento, 2015), although hygienic handling and pre-processing waste remain concerns (Schneider, 2006). An action plan with Standard Operating Procedures (SOPs) is also important (Abreu; Spinelli; Pinto, 2011).

Waste can be donated for animal feed (Ribeiro; Pinto, 2018; Araújo; Carvalho, 2015) or composting, reducing the volume sent to landfills (Harmon; Gerald; American Dietetic Association, 2007; Siqueira; Abreu, 2016). Law nº. 15.224, of September 30, 2025, which institutes the National Policy to Combat Food Loss and Waste (PNCPDA), allows donors, including establishments serving ready-to-eat meals, to donate surplus food

that is within its expiration date and safe for human consumption, limits their civil liability to cases of intent, and creates the Food Donor Seal (Brasil, 2025).

Finally, proper disposal of used cooking oil is crucial, as it can be repurposed into animal feed, soap, biodiesel, paints, and solvents, reducing environmental impacts (Thode Filho et al., 2014; Turchetto et al., 2016).

3.2 Rational use of water and energy: training employees and raising awareness among diners

Conscious use of water and energy was highlighted in commercial services by Ribeiro and Pinto (2018) and Gonçalves et al. (2018), and in hospital services by Luduvice et al. (2020), Silva et al. (2022), and Melo and Strasburg (2020) (Table 1). Santiago, Ramos and Batista (2022) also found that a commercial service reused the water from sanitizing vegetables to clean its patio. In a hospital, Baía et al. (2025) identified inefficient resource use in the water supply system and proposed sensors on faucets, a water reuse plan for toilet flushing, renewable energy sources, and improved natural lighting and ventilation.

Preserving water and energy is a global concern, integral to the Sustainable Development Goals (Gonçalves, 2009) and, in Brazil, to the National Water Resources Policy, which seeks to ensure quality water for current and future generations (Brasil, 1997). Effective management depends on training employees and raising diner awareness. Souza et al. (2025) observed that 71.4% of commercial establishments invest in environmental training for their staff, and Baía et al. (2025) reinforced its importance. This approach is an effective strategy for minimizing waste and mitigating negative impacts on society and the environment (Silva et al., 2022).

Practical actions include installing flow restrictors on faucets, repairing leaks, reusing water from rinsing fruits and vegetables, cooking, and dishwashing, and thawing food under refrigeration instead of running water (Harmon; Gerald; American Dietetic Association, 2007; Silva et al., 2022). Alternative energy sources, energy audits, and optimized natural light and ventilation are also essential for reducing energy consumption (Harmon; Gerald; American Dietetic Association, 2007; Silva et al., 2022).

3.3 Use of seasonal, regional, and/or family farm-grown foods

Incorporating seasonal products from local producers and choosing organic ingredients contribute to a sustainable menu and help preserve traditional cuisine (Vargas et al., 2021). Seasonal foods in menu planning are considered relevant in commercial, hospital, and institutional services (Santiago; Ramos; Batista, 2022; Silva et al., 2022; Ribeiro; Pinto, 2018; Spinelli et al., 2020). Souza et al. (2025) found high adoption of local purchasing (85.7%) and seasonal products on menus (71.5%) in commercial establishments, and Gonçalves et al. (2018) reported purchases from family farms among the units examined.

Family farming and agroecology are viable alternatives for sourcing sustainable raw materials. Agroecology minimizes environmental impact by avoiding chemical residues (Caporal; Costabeber, 2004), whereas

family farming involves small rural producers who rely on family labor (Brasil, 2006). It also preserves biodiversity, strengthens local economies, provides nutritious and traditional foods, and supports regional eating habits (Nogueira et al., 2022). By buying directly from local producers, services reduce costs and stimulate local trade while diners gain access to foods with lower levels of harmful substances (Mota et al., 2017). Sustainable management practices and less harmful agricultural inputs are also important (Perfecto; Vandermeer, 2010).

3.4 Full utilization of food

Santiago, Ramos and Batista (2022) found that commercial units used food in its entirety, including clean leftovers, while meeting all hygiene criteria, and Gonçalves et al. (2018) observed the same in most commercial restaurants evaluated. These strategies are relevant because food waste, combined with resource depletion, biodiversity loss, and climate change, aggravates environmental problems and food insecurity, making maximum food utilization a viable solution (Santos et al., 2020). Incorporating peels, stalks, and leaves into preparations also encourages healthier eating habits, reduces expenditure, and decreases waste (Gondim et al., 2005).

In institutional services, Barata et al. (2025) showed that utilization can extend to pre-preparation, monitoring beef, pork, and chicken trimmings and reintegrating them into products such as sausages and hamburgers, a Circular Economy approach that turns costly waste into raw material. Similarly, Baía et al. (2025) proposed full use of peels, stalks, and leaves in nutritious preparations, with microbiological analyses to ensure safety, and the donation of edible meat trimmings, aligned with the legislation in force at the time (Law 14.016/2020), which aimed to combat hunger and reduce waste.

3.5 Residue-ingestion analysis

The Residue-ingestion Index measures the food distributed to diners but not consumed, calculated by dividing the weight of discarded food by the total weight of the meal distributed and multiplying by 100. In healthy communities, an index below 10% is considered acceptable (Abreu; Spinelli; Pinto, 2011). When it is high, it is essential to evaluate whether dishes meet desired sensory characteristics, whether serving utensils are appropriate, and whether portions were excessive (Augustini et al., 2008; Abreu; Spinelli; Pinto, 2011), allowing managers to verify whether the amount prepared matches consumption habits and menu acceptability (Ricarte et al., 2008).

This index was applied effectively in commercial (Santiago; Ramos; Batista, 2022), hospital (Santos et al., 2019; Silva et al., 2022), and institutional settings (Chagas et al., 2021). Santos, Pereira, and Albuquerque (2020) applied Environmental Education strategies in a university restaurant and observed a significant reduction in per capita food waste, averaging 9.8 g (18%). Turchetto et al. (2021) found a waste percentage

consistent with the literature in an institutional unit, although the à la carte system showed a notably higher rate. Waste above 10% suggests poor menu planning, which can affect service quality (Mezomo, 2015).

3.6 Analysis of leftovers

Leftovers analysis has been applied in industrial (Zão et al., 2020), institutional (Chagas et al., 2021; Araújo; Carvalho, 2015), and commercial services (González et al., 2017; Santiago; Ramos; Batista, 2022). Unlike residue-ingestion, leftovers correspond to food prepared but not distributed, and their analysis is fundamental for reducing waste (Tomaszewska et al., 2024). The ideal percentage is below 3%, with 7 g to 25 g per person accepted in the literature (Vaz, 2006), calculated by dividing total leftovers by total food produced and multiplying by 100 (Abreu; Spinelli; Pinto, 2011).

The amount of leftovers indicates whether the menu was well planned, whether production matched the number of diners, and whether there are problems with portion sizes and utensils (Vaz, 2006). Milane and Leite (2019) observed significant variations in an institutional unit, attributed to a lack of portion standardization, inadequate technical data sheets, and insufficient training. Recording leftovers and consumption reduces raw material costs and waste, which requires raising employee awareness (Mascarenhas; Torres, 2012), and nutritionists or managers should assess portions, production, utensils, and preparations (Abreu; Spinelli; Pinto, 2011).

3.7 Menu planning and preparation of technical data sheets

Proper menu planning ensures food in sufficient quantity and quality for individual well-being and minimizes ingredients with a greater negative impact on the environment and human health (Pimenta; Gomes, 2012). Santiago, Ramos and Batista (2022), Araújo and Carvalho (2015), and Luduvice et al. (2020) found that commercial, institutional, and hospital services planned their menus. A menu that considers the regional climate, the number of diners, and the required quantities of raw materials reduces waste and improves meal quality (Dias; Oliveira, 2016), and greater variety of sustainably produced local foods promotes minimal use of agricultural inputs (Harmon; Gerald; American Dietetic Association, 2007; SILVA et al., 2022).

Technical data sheets complement planning by standardizing preparations, ensuring uniform quality, and aiding cost control and purchasing planning. By describing preparation steps and guiding production, they help reduce waste (Abreu; Spinelli; Pinto, 2011). Their use was the most common practice (92.9%) among the commercial establishments assessed by Souza et al. (2025), indicating a tendency toward optimized resource management, consistency, and operational efficiency.

3.8 Diner satisfaction assessment

Mariosa and Alves (2019) applied a Satisfaction Survey with an electronic voting device in a Food and Nutrition Unit and found 93.2% satisfaction. Chagas et al. (2021) reported menu acceptability from 85.92% to 97.44% in an institutional unit providing delivered meals. Assessing satisfaction reveals the clientele's profile and perceptions, and high satisfaction may lead to greater adherence to the menu (Abreu; Spinelli; Pinto, 2011). In contrast, Cavalcante et al. (2017) found only fair satisfaction in an institutional unit, with complaints about repetitive protein options and inadequate utensil hygiene, and dissatisfaction often results in increased waste (Viana et al., 2015).

The satisfaction survey is therefore a relevant tool, as it reveals customers' perceptions and needs and supports an action plan to improve service quality, especially in areas with negative evaluations (Proença et al., 2005; Honicky et al., 2017). Satisfaction is considered satisfactory above 80% and can be assessed through the menu acceptability index (Dutcosky, 2013), in addition to electronic and written surveys. It is also correlated with the amount of leftovers and scraps, and a well-designed, appealing menu can reduce waste, contributing to sustainable development (Veiros; Proença, 2003).

4 CONCLUSIONS

This review comparatively analyzed the sustainable strategies and practices adopted in Brazilian industrial, institutional, hospital, and commercial food services between 2015 and 2025. The results revealed a growing concern with sustainability in the sector, although approaches and action focuses differ considerably among types of units.

Waste management, rational water and energy use, staff training, and customer awareness were the most consolidated strategies across all segments, along with the use of seasonal, regional, and family-farming ingredients. Commercial services stood out for their engagement in sustainable practices, while hospital and institutional services linked sustainability to food quality, integral food utilization, and leftover monitoring. Industrial services reported fewer practices, suggesting a gap in implementation or documentation. Overall, strategies concentrated on operational measures, with limited adoption of structural and technological solutions, formal process documentation, and monitoring of results.

Thus, the success of these practices depends on coherence between planning and execution, and managers should invest in continuous training and in technologies that conserve water and energy. This study provides a foundation for further research and for the development of more strategic and integrated action plans in Brazilian food services.

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