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ARTICLE



Sustainability practices in public institutional restaurants: definition of criteria using the Delphi technique

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Abstract

The objective of this investigation was to define criteria for environmental, economic and social sustainability practices at all stages of the institutional restaurant meal production process. The method was based on an initial 35 criteria model relying on the literature, and subdivided into three dimensions: natural resources, stages of the meal production process, as well as certification and training programs for employees. This model was sent to 36 specialists for the application of the Delphi Technique, through an online form, using the 5-point Likert scale, considering the relevance and difficulty of the execution of each of the criteria. The criteria that reached an average greater than or equal to 3.5 in relation to the level of relevance were considered accepted. After the analysis of the dimensions by the investigation participants indicated that the 35 criteria were approved and two new ones were included. The 37 criteria are arranged in order of relevance and levels of difficulty. This order is intended to help to instruct managers and nutritionists in assessing and determining priority actions in institutional restaurants, in order to achieve sustainable practices. The 37 defined criteria can help institutional restaurants determine priority actions for sustainability practices. In addition, it can be inferred that the 37 criteria defined and validated by experts can support the design of programs or policies related to FNS (Food and Nutritional Security) and to sustainability.

KEYWORDS

Sustainability; restaurants; Delphi technique; food services

Introduction

Sustainability is increasingly becoming a critical topic in the environmental, social and economic global context and affects several segments. (Cantele & Fabio, 2020). Specifically in the food service segment stand out the institutional restaurants like public facilities with regular food demand. For example, there are restaurants of schools, hospitals, prisons, popular restaurants and university restaurants. (Martinelli et al., 2015). Such restaurants have important potential in promoting food security, as well as contributing to the development of more sustainable agri-food systems in the local territories where they are located (Stahlbrand, 2016). In Brazil, despite advances in policies and programs aimed at reducing social inequalities, hunger and

food and nutrition insecurity are pervasive problems (Anjos & Caldas, 2018). In this context government-subsidized restaurants and similar food programs are aimed at minimizing inequality in access to food (Cunha et al., 2020).

These restaurants perform the functions of the meal production process and involve stages ranging from menu planning to meal distribution (Proença RPC, 2000). These steps are related to the generation of negative environmental, economic and social impacts (Lopez et al., 2019; National Restaurant Association (NRA), 2018) and they need to be aligned to sustainability concepts (Clark, 2017; Sakaguchi et al., 2018; Ottenbacher et al., 2019). Sustainability is based on ensuring the availability of natural resources for future generations by integrating the environmental, social and economic dimensions that characterize the triple bottom line (Sachs, 1993; Sustainable Food Policy, 2007).

Recognizing the importance of sustainability in food production and consumption, the Food and Agriculture Organization of the United Nations (Food and Agriculture Organization (FAO), 2012) conceptualized sustainable food as “with low environmental impacts, which contribute to Food and Nutritional Security (FNS), and to the healthy life of present and future generations.” Researchers emphasize that healthy and sustainable feeding involves the production of agro-ecological, regional foods that foster family farming and protect biodiversity (Martinelli and Cavalli, 2019). In this sense, Triches and Hawkes (2020) point out the sustainable diets must be constituted to have the potential to recalibrate the current food system. This system compromises the ability to produce food in the future and can have irreversible effects on the ecosystem and health.

The UN Sustainable Development Goals (United Nations General Assembly, 2015) defines as global targets for the next decade has increased awareness of global social and environmental issues, which require a common response from national governments, public administration, nongovernmental organizations and businesses, and people worldwide.

However, the role of institutional public restaurants in this area is still poorly studied despite the discussions about sustainability being on the worldly agenda. It represents one of the major challenges for nutritionists and managers in this segment. It is important that the creation of regulatory standards for sustainability in restaurants starts in the public sector and then extends to the private sector.

In view of this, in order to achieve a more sustainable food system, recommendations and criteria for sustainable restaurant practices have been discussed strategically. For example, researchers from the *American Dietetic Association* (ADA) (Harmon & Gerald, 0000) published guidelines on sustainability practices directed at nutritionists, and food and nutrition professionals that can be implemented by restaurants. Private initiatives in a variety of countries, such as the United States, Canada, Japan, Scandinavia and

Turkey, were also recognized for consulting and also certifying guidelines for making restaurants more sustainable (Green Key, 2015; Green Restaurant Association [GRA], 2016; Green Table Network, 2007; Japan Environment Association, 2007; Ozturk & Akoglu, 2020; The Nordic Council of Ministers, 2020; SDG2 Advocacy Hub, 2017–2020). The recommendation consists in rationalization of the contribution of resources with the limitation of those which are exhaustible or harmful to the environment, reduction of the volume of waste and recycling practices, preparation of menus containing healthy foods produced through safe and fair agroecological practices, thus promoting the strengthening of the local economy, and the promotion of agriculture and the development of more sustainable food agrosystems.

In addition, the research aiming at developing systems for the evaluation of restaurants according to sustainability in all stages of meal production (Wang et al., 2013) were verified. These systems which evaluate sustainability practices of restaurants at all stages of the meal production process: menu planning, purchase of foodstuffs, receiving, storage, preparation, pre-preparation and distribution of meals, as well as the research in relation to the specific acquisition stages (Goggins & Rau, 2016). Furthermore, Brazilian research stood out for conducting sustainability practice assessments in restaurants focusing on the environmental dimension (Barthichoto et al., 2013; Colares et al., 2018; Mota et al., 2017; Vial, 2017). Several studies on sustainability in restaurants have been verified in the literature, focused on some of the stages of the meal production process, with emphasis on the environmental dimension of sustainability, which revealed a growing concern of the meal production segment in relation to sustainability in Brazil and the world. However, it has been noticed the absence of studies related to systems for evaluating environmental, social and economic sustainability practices, based on criteria that involve all stages of the meal production process, aimed at Brazilian institutional restaurants. Therefore, there was a lack of studies that systematize recommendations for sustainability practices for Brazilian institutional restaurants, encompassing all stages of the productive feeding system, combined with the three dimensions of sustainability.

In view of the above, there was a need to set criteria of sustainability practices considering the responsibility of institutional restaurants on environmental impacts. There is also the need to pursue sustainable production and consumption, considering the environmental, economic and social dimensions in all stages of the productive process of meals in institutional restaurants. This is the objective of this study.

Methods

This is a qualitative and quantitative investigation (Richardson, 2012) of development (Contandriopoulos et al., 1997).

Ethical aspects

The study was approved by the Human Research Ethics Committee in September 2018. All participants signed a Free and Clarified Consent Term (FCCT).

Selection of participants

To compose the panel of specialists of the present investigation, 36 nutritionists from different regions of Brazil were invited by e-mail, and finally, 19 nutritionists out of 36 respondents participated in the survey. This number is considered to be sufficient to generate relevant information (Wright & Giovinnazzo, 2000). Participants were identified from an intentional search and through a survey of researchers on the CNPq Lattes Platform. Such survey considered the search terms: “collective food” related to “meal production” or “sustainability.” Inclusion criteria were: being a nutritionist and having a minimum of one year of professional experience in collective feeding, or being a researcher in the area of collective feeding and/or sustainability. It is noteworthy that in Brazil the presence of a nutritionist in public restaurants is mandatory. This professional is responsible for planning, organizing, directing, supervising and evaluating the restaurant, playing a major role in the management of the unit, promoting actions to encourage sustainable development (Conselho Federal de Nutricionistas (CFN), 2018).

Consensus study

Delphi Technique was indicated as a research tool. It consists of reaching a qualified collective opinion on certain issues. It is indicated when seeking consensus on a particular subject (Wright & Giovinnazzo, 2000). According to the authors, the applicability of the technique occurs through an interactive instrument that is repeatedly circulated by the expert group (round of opinion) through analysis and feedback from the researcher. Such analysis and feedback may happen in two or more rounds of opinion, until consensus is reached. In the present research, the Delphi Technique was performed in two stages: 1) literature review and elaboration of the initial criteria model, 2) Expert panel with two rounds.

Preparation of initial criteria model

The initial model of criteria was elaborated from a narrative literature review (Vosgerau & Romanowski, 2014). It was combined with a documentary search allowed the description and reflection from a broad perspective on the studied

theme Searches were performed from June to August 2018 in order to meet the goal that emerged from the research question: “What are the criteria for sustainable practices for the production of meals, in the environmental, economic and social dimensions, considering all stages of the production process in institutional restaurants?” For this, searches were performed in the *Scopus*, *Scielo* and *Google Scholar* databases, combining terms in English *restaurants* or *food service* and (*sustainable* or *sustainability* or *green practices*). There was no date limitation, country of study or area of knowledge. Original articles, review articles, as well as documents and standards in the English and Portuguese languages were included.

After the search, twelve documents were considered including seven complete articles (Baldwin et al., 2011; Di Pietro et al., 2015; Dogan et al., 2015; Goggins & Rau, 2016; Martinelli et al., 2020; Mikkola et al., 2009; Wang et al., 2013), and five public and private documents containing recommendations for sustainable practices in food service (Green Table Network, 2007; Harmon & Gerald, 2007; GRA, 2016; Japan Environment Association, 2007; ONU, Organização das Nações Unidas, 2015). The articles and documents were analyzed using the inductive method. According to Lakatos and Marconi (2003), it “is a mental process through which, based on particular data, sufficiently verified, one infers a general or universal truth, not contained in the examined parts.” As a result of this analysis, the initial 35 criteria model for sustainability practices was prepared. Then, it was subjected to expert analysis using the Delphi Technique.

These 35 criteria were organized into an *online* form that was pre-tested following the recommendations of Powel (2003), with the participation of three researchers from the Meal Production Research Nucleus (NUPPRE/UFSC), for analysis, seeking clarity in the application of the instrument. Afterward, the criteria model was submitted to the evaluation of the selected specialists.

Form

The form was prepared with a summary of the main known information on the subject (Wright & Giovinazzo, 2000). It was divided into two blocks: the first related to the profile of the experts, and the second related to the criteria for sustainable practices, containing title, definition and justification of the criterion to be evaluated. A 5-point Likert scale (Likert, 1932) was used for the assessment, in which the experts evaluated each criterion for its relevance (5 = very relevant and 1 = totally irrelevant) as well as for the difficulty (5 = very difficult and 1 = very easy) for it to be done in the restaurants. In addition, for each criterion there was a field in which the expert could make suggestions.

The form was built on “Google Forms,” and sent *online* by e-mail. For general research information, a website was created where the specialist could access complementary materials containing guidance and the initial criteria model,

(<http://www.obass.com.br/pesquisasustentabilidade>) the return of the assessment was requested to be in 15 days (from March 23, 2019 to April 8, 2019).

Data analysis

The quantitative data collected were analyzed in spreadsheets using the *software* Microsoft Excel. The average and the standard deviation (SD) (Chu & Hwang, 2008) were calculated based on the quantitative responses. They were derived from the classification of the relevance of the indicators, according to Table 01. A criterion was considered accepted when the average was greater than or equal to 3.5 or when it was less than 3.5 but with standard deviation less than 1, according to parameters determined by Chu and Hwang (2008). The higher the mean, the greater the relevance of the criterion. Responses related to the difficulty level of the criterion execution were also analyzed according to the average, they were classified as: low (average up to 1.66), intermediate (average 1.67 to 3.33) and high (average above 3.33). The suggestions were incorporated into the final model, and the experts received answers with the justification in case they were not incorporated.

Results

The recommendations found in the literature review based the initial model of criteria for assessing sustainability practices in institutional restaurants. They were subdivided into three blocks (Natural resources; Stages of the production process of meals; Environmental certification, employee training and user awareness programs).

The initial criteria model was submitted to a panel of experts, composed by 19 people, residing in the southern (89.5%; $n = 17$) and southeast (10.5%, $n = 2$) regions of the country. All graduated in Nutrition, being 52.6% ($n = 10$) PhDs, 36.8% ($n = 7$) Masters and 20.5% ($n = 2$) specialists in Nutrition and related areas. Among them, 78.9% ($n = 15$) work in Universities, 10.5% ($n = 2$), 5.3% ($n = 1$) private institution, 5.3% ($n = 1$) government institution, and 5.3% ($n = 1$) and 5.3% ($n = 1$) in a private and philanthropic institution.

First round

All proposed criteria were accepted in the first round, with no exclusion. The classification derived from the evaluation of the established parameters. Regarding the level of difficulty for implementation, 17.14% ($n = 6$) of the criteria were classified as low level. That is, they were easier to perform, while 74.28% ($n = 26$) intermediate and only 8.57% ($n = 3$) high. Criteria considered as easy to perform, presenting an average of up to 1.66, according to the pre-established methodology were 1, 7, 9, 11, 22 and 24. Three criteria (8.57%) were considered very difficult to perform, presenting difficulty average equal to or

greater than 3.33 (13, 17 and 29). Regarding relevance, most of the criteria (97, 14% = 34) presented an average higher than 4, with emphasis on the criteria 4,7,9,24 and 33 which presented absolute consensus, with an average of 5.00 as shown in [Table I](#).

The comments and suggestions made by the experts were incorporated into the material, whenever consistent with the objective and theoretical justification of the criteria model. After analyzing the answers from the first round, and making the necessary adjustments, a new form was prepared and sent to the participants, starting the second round.

It stands out that the 35 criteria evaluated by the experts were approved in the first round, with few minor suggestions of changes in their writing. There was also a suggestion to include two new criteria: “36 - To avoid the excess of cattle meat on the menu” and “37 - To reduce the use of disposable materials (disposable cups and napkins, plastic water bottles, straws) to preferably reusable ones.” As requested, changes and additions were made and approved in a second round of analysis from experts.

Second round

In the second round of the Delphi Technique 100% (n = 19) of the experts participated, with no dropout. Participants received individual *feedback* regarding the results obtained in the first round, as well as justification for accepting or not accepting suggestions. A new form was submitted containing the proposal to include two new criteria (36 and 37). They were accepted with an average of over 4.00 as shown the [Table I](#).

At the end of the second round, a satisfactory level of convergence in responses (average ≥ 3.5) was reached. Therefore, no third round was required, resulting in the final approval of the document.

Discussion

This study defined sustainability criteria for public institutional restaurants based on a consensus among experts. The criteria considered most relevant were: 4,7,9,24 and 33. The classification in order of difficulty showed that criteria 13, 17 and 29 were considered the most difficult to implement.

Some criteria, although considered relevant, received input from the experts. The criterion “8 To use quantity recipe” was considered very difficult to implement by some experts. The experts signaled the difficulty that nutritionists, managers and collaborators of Food and Nutrition Units have to use, either regarding lack of knowledge or lack of time due to work overload. The importance of enabling professionals and academics to effectively use quantity recipe was highlighted. It was emphasized that legislation that would make quantity recipe mandatory would help in the process, as it is an essential tool

Table 1. Criteria for sustainability practices in institutional restaurants of implementation difficulty and of relevance and level.

Assessed Criteria	Difficulty			Relevance		
	Average	SD	Classification	Average	SD	Classification
Natural resources (water and electricity)						
1. To use economical and efficient lamps (LED - <i>Light Emitting Diode</i>)	1,57	0,90	Low	4,89	0,31	Accepted
2. To use lighting activation system with presence sensors	2,47	1,02	Intermediate	4,52	0,61	Accepted
3. To use equipment with energy efficiency seal	2,36	1,30	Intermediate	4,94	0,22	Accepted
4. To perform preventive maintenance on electrical equipment	2,42	1,16	Intermediate	5,00	0	Accepted
5. To use smartly controlled taps or flow reducers for rational water use	2,47	1,07	Intermediate	4,89	0,31	Accepted
6. To have a cistern for rainwater use	2,94	1,12	Intermediate	4,42	1,12	Accepted
Stages of the production process of meals						
<i>Menu Planning:</i>						
7. To have a menu prepared by a nutritionist	1,47	0,77	Low	5,00	0	Accepted
8. To use quantity recipe	2,94	0,84	Intermediate	4,89	0,31	
9. To include seasonal foods on the menu	1,63	0,83	Low	5,00	0	Accepted
10. To include WEP (Wild Edible Plants) as ingredients of menu preparations	3,21	1,03	Intermediate	4,31	0,74	
11. To include regional foods that are part of food culture in the menu	1,68	0,82	Low	4,94	0,22	Accepted
12. To avoid high-processed foods (rich in sugar, fat, sodium, stabilizers and preservatives) on the menu	2,57	1,30	Intermediate	4,73	0,73	
<i>Purchasing of food:</i>						
13. To purchase organic food, preferably agro-ecological based ones	3,36	0,89	High	4,89	0,31	Accepted
14. To prioritize the purchase of products directly from family farmers in the shortest geographical distance possible	2,52	0,84	Intermediate	4,94	0,22	Accepted
15. To select suppliers that offer fair and safe working and wage conditions for their employees/producers	3,21	1,28	Intermediate	4,94	0,22	Accepted
16. To avoid the purchase of food in small and individual packages						
17. To avoid the purchase of genetically modified foods	3,52	1,17	High	4,84	0,37	Accepted
18. To purchase preprocessed vegetables (previously sanitized, peeled, cut)	2,94	0,84	Intermediate	4,26	0,93	Accepted
<i>Receipt of food:</i>						
19. To avoid receiving frozen foods	3,15	1,21	Intermediate	3,89	0,99	Accepted
20. To prioritize receiving adequate quantities by planning according to per capita and number of meals planned	1,73	0,87	Intermediate	4,89	0,31	Accepted
<i>Food storage:</i>						
21. To perform control and maintenance of food storage areas in relation to temperature, ventilation and hygiene, according to standards established by law	2,10	0,93	Intermediate	4,94	0,22	Accepted

(Continued)

Table 1. (Continued).

Assessed Criteria	Difficulty			Relevance		
	Average	SD	Classification	Average	SD	Classification
Pre-preparation of food:						
22. To perform proper hygiene of fruits and vegetables with rational use of water, and use of sustainable sanitizing products	1,47	0,61	Low	4,94	0,22	Accepted
23. Do not defrost food in running water	2,10	1,04	Intermediate	4,94	0,22	Accepted
24. To perform food loss monitoring	1,63	0,95	Low	5,00	0	Accepted
Preparation of food:						
25. To perform proper separation of frying oil and forward it for recycling	2,05	1,07	Intermediate	4,47	1,02	Accepted
26. To avoid the presence of fried foods by immersion in the menu	1,89	0,80	Intermediate	4,47	1,12	Accepted
27. To perform full use of food, preferably organic, using stalks, leaves, flowers and seeds as ingredients of the preparations	2,26	0,93	Intermediate	4,89	0,45	Accepted
28. To use sustainable cooking methods.	2,21	1,03	Intermediate	4,94	0,22	Accepted
Food Distribution:						
29. To perform control of rest ingestion	3,52	1,02	Hight	4,26	0,99	Accepted
30. To perform acceptability tests	1,94	1,07	Intermediate	4,94	0,22	Accepted
31. To perform integrated solid waste management in accordance with the National Solid Waste Policy (NSWP)	1,73	0,93	Intermediate	4,68	0,74	Accepted
32. To have a compost separator on site	3,21	1,08	Intermediate	4,57	0,69	Accepted
Environmental certification, employee training and user awareness programs						
33. To conduct periodic training for employees on sustainability practices;	2,21	1,13	Intermediate	5,00	0	Accepted
34 To adhere to Environmental Management Certification Programs	2,21	1,13	Intermediate	5,00	0	Accepted
35.To perform educational actions to sensitize diners, focusing on sustainability, periodically	1,73	0,93	Intermediate	4,68	0,74	Accepted
Criteria inserted on the second round						
36. To avoid the excess of cattle meat on the menu	2,94	1,43	Intermediate	4,46	0,89	Accepted
37. To reduce the use of disposable materials (disposable glasses and napkins, plastic water bottles, straws) preferring reusable materials.	2,63	1,11	Intermediate	4,94	0,22	Accepted

for purchasing planning and meal standardization. In this context, it is evident the initiative of the National Fund for Education Development (FNDE) (Brasil. Resolução no 26 de 17 de junho de 2013, 2013) that makes the use of quantity recipe mandatory on the elaboration of the Brazilian National School Food Program. Such normative is the Resolution CD/FNDE n. 26, of June 17, 2013, this is an example that could be extended to other segments of meal production.

The criterion “18 purchase pre-processed vegetables (previously sanitized, peeled, cut)” has been added due to the increased food waste that occurs in the

pre-preparation of meals, given the difficulties faced by the sector in maintaining a qualified workforce, and in the acquisition and maintenance of adequate equipment and utensils (Zanini et al., 2020). The acquisition of pre-processed vegetables presents advantages such as the reduction of laboring time, reduction of water and power usage, the need of less storage room, the acquisition of pre-processed foods with the required standardized portions and accurate size, hygienic-sanitary safety, and consequently the reduction in the generation of organic waste in the restaurant (Andreatti et al., 2013; Araújo et al., 2015).

Transferring the responsibility of food cleaning and cutting to a specialized agro-industry could reduce the negative impact generated by this activity in the restaurant, thus benefiting farmers as the creation of processing agro-industry is being encouraged, generating more income for these families (Cruz, 2020), thus strengthening the economic and social dimensions of sustainability. Furthermore, concentrating these activities in the agro-industry sector would allow to a more correct use of sanitizers and water, also destining the organic waste to composting, and it then being reused for food production (Cruz, 2020). However, the acquisition of pre-processed vegetables requires a prior analysis of the advantages and disadvantages according to the reality of each restaurant, also considering that it likely acts in the reduction of food waste and labor time, they can generate a greater amount of recyclable garbage from packaging, among other factors that need to be considered when making this choice (Tasca, 2020), such as the sustainable practices of the supplier company.

The criterion 22 related to the disinfection of vegetables through the use of sustainable sanitizing products, raised doubts among experts as to which products would be suitable for this action. Researchers point out that the use of sodium hypochlorite-based sanitizing products are the most used in Brazil (Bachelli et al., 2013). However, the formation of some toxic and carcinogenic byproducts is pointed out, also they may remain in food and water. In addition to affecting public health, they would affect the biological cycles of aquatic and terrestrial species in the environment (Richardson et al., 1998). In view of this, the US *Food and Drug Administration* (FDA) approved the use of chlorine dioxide, hydrogen peroxide, peracetic acid and ozone as disinfectants for vegetables as they are not harmful to human health or the environment (FDA, 2000). The search for alternative methods to sodium hypochlorite has been emerging as a matter of great interest in Brazil and worldwide (Bachelli et al., 2013).

Criterion 27 deals with the full utilization of food. That is, the use of stalks, leaves, flowers and seeds as ingredients. The experts pointed out the importance of this action being performed exclusively with organic foods, due to the presence of pesticides in conventional foods. Corroborating this concern, investigations highlight positive aspects of this practice, aimed at generating

savings, offering nutritionally rich foods, and reducing the volume of organic waste in the establishments (Brasil. Resolução no 38 de 16 de julho de 2009, 2009). However, it is emphasized the importance of performing this action preferentially with organic foods or from agroecological systems, because such products are free of pesticides. The use of crop foods is also recommended because they usually receive, on average, a lower load of pesticides (Lima & Sousa, 2011). According to the National Sanitary Surveillance Agency (ANVISA), pesticides used in the production of conventional foods can be classified according to their mode of action. Such modes can be systemic and contact. The former penetrates the inside of the leaves and pulps, whereas the contact ones act mainly on the external parts of the vegetable, although a quantity can be absorbed by the internal parts. Thus, washing procedures of food in running water and the removal of peel and external leaves contribute to the reduction of residues of pesticides present in the exterior, but these procedures are unable to eliminate those pesticides contained inside the food (Portal Agência Nacional de Vigilância Sanitária ANVISA, 2019). In view of this, in order to avoid possible damage to health, the best alternative is the integral consumption of organic products.

According to the experts, some criteria were considered very difficult to implement. Criterion 13 (“To purchase organic food, preferably agroecological based ones”) was considered very difficult to implement due to the fact that in some regions of the country there is little supply of these products, and they are usually more expensive compared to the traditional ones. Then, this practice can become impracticable considering the resource limit of institutional restaurants. In addition, it was highlighted that the use of agricultural inputs is still a reality that needs to be discouraged, and organic agriculture needs to be encouraged in the country through public policies. The organic production system involves optimizing the use of available natural and socioeconomic resources and respecting the cultural integrity of rural communities. Organic production aims at economic and ecological sustainability and maximizing social benefits (Brasil. Lei 10.831, de 23 de dezembro de 2003, 2003). In addition, research highlights the superiority of the nutritional composition of organic foods (Hunter et al., 2011), reduction of diseases caused by the use and consumption of pesticides (Baránski et al., 2014), as well as the reduction of the environmental impact of production (Horrigan et al., 2002).

The specialists emphasized the difficulty of understanding, from nutritionists and managers, about the possible damages to health and the environment resulting from GMO products as well as the low supply of products free of genetically modified organisms (GMOs), considering that many industrialized products are or have genetically modified ingredients. In this sense, the Federal Council of Nutritionists (CFN) recommends the nonuse of transgenics in the production and consumption by the population, until further researches are done, because the production and consumption of these foods

have been related to environmental, social impacts and health (Conselho Federal de Nutricionistas (CFN), 2012). Cortese et al. (2018) identified the presence of at least one potential Genetically Modified (GM) ingredient in more than half of the most consumed food variety by the Brazilian population, with distinct nomenclatures. This can make it difficult to identify possible GM foods.

Regarding the criterion “36 To avoiding the excess of cattle meat on the menu,” inserted in the second round, experts pointed out that this measure could face resistance from diners based on a cultural issue. In addition, contracts with collective food companies usually require cattle meat to be the most frequent on the menu. Regarding this, researchers have identified that the greatest environmental impacts come from the production of ruminant meat, including cattle (Clark & Tilman, 2017). This accounts for 80% of agricultural greenhouse gas emissions, and thus it has an undesirable effect on climate changes (Bacon & Krpan, 2018). In addition, researchers have found that many consumers have been reluctant to reduce cattle meat consumption due to concerns about nutritional imbalance (Ritchie et al., 2018). Such reluctance may be dealt through health and nutrition education. Issues like this can be overcome through nutritional and environmental education campaigns with consumers, promoting approximation and awareness of sustainable causes. Furthermore, to offer tasty and attractive meatless preparations would also help to overcome this difficulty.

The criteria were defined based on the reduction of environmental, social and economic impacts, based on the Triple Bottom Line (Elkington, 1997). In spite of the literature addressing some issues as being strictly environmental, this work considered an expanded approach where the three dimensions of sustainability are addressed together. For example, the food purchasing criteria can be considered to be environmental, but they also have a strong social and economic bias, what makes it difficult to separate criteria into just one dimension. This analysis is also in line with the study by Loviscek (2021) on the state of the art of the Triple Bottom Line concept, which takes a look at the need to implement a holistic framework to fulfill sustainable development in all three elements together. Additionally, it is observed in the international scientific literature (Harrison et al., 2022; Jones et al., 2016) that there is a tendency to use environmental criteria in studies on food and sustainability.

However, classifying indicators as strictly environmental, undermines the understanding of the general implications. For example, locally purchasing from family farmers can be considered an environmental indicator, but when we reflect on the impact of this purchase on the income and lives of small farmers, the dimensions expand to social and economic. In this sense, we kept the three dimensions in the text as benefits of the actions presented.

The reality of public institutional restaurants in Brazil differs from other countries and it has been considered by the experts in the evaluation of the

proposed criteria. Brazilian institutional public restaurants, which include schools, hospitals, armed forces, penitentiaries, popular restaurants and university restaurants, represent a large part of the meals served outside the domestic environment. These establishments are characterized by the regular and permanent offering of a large number of meals to the population, most of whom are in a situation of social vulnerability. Brazilian establishments must follow their own local set of legislation, such as sanitary issues (Brasil. Agência Nacional de Vigilância Sanitária. Resolução RDC nº 216, de 15 de setembro de 2004, 2004), the mandatory presence of a nutritionist (Conselho Federal de Nutricionistas (CFN), 2018) and the compulsory purchasing from local family farms (Brasil. Presidência da República, 2015). In addition, the territorial extension of Brazil and the commerce system of aliments differ from other countries, with a large number of small farms which produce basic staple foods (IBGE, 2017), and this should be considered in the recommendations to attend the Sustainable Development Goals (SDGs) (ONU. Organização das Nações Unidas, 2015) in restaurants.

This way, Brazilian institutional public restaurants represent some important potential in promoting food security and adequate food intake, as well as contributing to the development of family farming and more sustainable agri-food systems in the territories where they are located (FAO, 2016; Martinelli et al., 2015; Stahlbrand, 2016). These are instruments which the State can use to guarantee the right of consumers to adequate food intake, to influence markets based on agricultural and food supply and distribution policies, as well as to enable the insertion of farmers who are on the margins of markets, offering them resources for their Food Security and encouraging rural development. In this sense, it deals with the perspectives of autonomy of these farmers and food self-sufficiency, linked to Food Sovereignty. Finally, sustainability is achieved when these actions not only strengthen the regional economy and social equity but mainly establish more environmentally, nutritionally and culturally adequate production and consumption relations, given that the sustainability of the food system depends on its relationship with nature (Triches et al., 2022).

Considering the 37 criteria, it is understood that sustainable practices require prior planning to obtain financial availability. Suppliers that have products that meet the required needs is also needed, in addition to the need for specific labor training and diner awareness. Thus, it is understood that the proposed criteria are relevant, however their implementation should be aligned with the reality of each restaurant, respecting its cultural, economic and geographical aspects.

Final considerations

From the Delphi Technique integrated to the 5-point Likert scale, it was possible to define 37 criteria for environmental, economic and social sustainability practices in institutional restaurants, at all stages of the meal production process.

The 37 criteria are arranged in order of relevance and levels of difficulty. This order is intended to help to instruct managers and nutritionists in assessing and determining priority actions in institutional restaurants, in order to achieve sustainable practices. In addition, it can be inferred that the 37 criteria defined and validated by experts can support the design of programs or policies related to FNS (Food and Nutritional Security) and to sustainability.

Thus, performing schedules and strategies is suggested for the implementation of all criteria. Doing such actions based on the continuous improvement of sustainable measures in food services and considering the reality and needs of each place or region in which the restaurant is inserted. Particularly in public restaurants, legislation can be high standards such as the potential of public restaurants in reducing the negative environmental, social and economic impacts of the production of meals.

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No potential conflict of interest was reported by the authors.

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