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Chapter

How to Build Food Safety Resilience in Commercial Restaurants?

Rayane Stephanie Gomes De Freitas and Elke Stedefeldt

Abstract

In this chapter, food safety is portrayed as an intrinsic component of food security and food systems. The objective is to discuss the 'commercial restaurant' system and the 'kitchen worker' subsystem from the perspective of building resilience in food safety. Relationship maps built for the system and subsystem guide the presentation and discussion of structural, organisational, social and symbolic aspects and elements. Resilience investigation is based on the references of the International Risk Governance Centre Resource Guide on Resilience and current and emerging topics related to food safety, such as risk perception of foodborne diseases, cognitive illusions, sociological aspects, social dimension of taste, humanisation and working conditions and precariousness of work in kitchens. In the final section, a list of recommendations for building resilience in commercial restaurants is presented to help researchers, decision-makers and practice agents apply this concept in their fields of expertise.

Keywords: food safety, food systems, restaurants, food handlers, foodborne disease

1. Introduction

There is an urgent need for food safety to be critically rethought in the twenty-first century, considering the breadth of systemic interconnections that predispose food, the environment, animals and humans to known and unknown hazards. These hazards may be present in activities related to food production, processing, distribution, preparation and consumption. One of the barriers to the scientific advancement of food safety is that it is often not treated as an essential and indispensable component of food security in food systems.

However, these three components are inextricably linked. According to the report *The State of Food Security and Nutrition in the World 2021*, food security and nutrition embrace the right of everyone to access quality food based on practices that promote health and are environmentally, culturally, economically and socially sustainable, considering the lenses of food systems as essential to address recent issues [1]. Unsafe food exposes people to several diseases and malnutrition, and there

is a greater probability of these conditions worsening among the most vulnerable [2]. Quality food, on the other hand, corresponds to harmless food produced in a way that respects the interaction between man, animal welfare and environmental conservation, provides healthy food choices and encompasses the dimensions of food preference, food preparation, feeding practices, food storage and water access [3, 4]. Food safety should be repositioned, because it is a component that undoubtedly makes up the triad, which includes food security and food systems, guaranteeing the human right to adequate food and health.

The crisis triggered by the COVID-19 pandemic exposed the fragility and unpreparedness of health services and the vulnerability of humans to the deficiencies caused by the current food system in several areas, making the words 'foresight, preparedness, and resilience' the new directive for leaders of global food systems [5]. Therefore, food safety needs to expand its scope of action, i.e. extend beyond the regulations that ensure the prevention of foodborne diseases (FBD) and also cover the long-term threats arising from risks associated with food, which affect the population and ecosystem at a global level [6].

Nowadays, people face an extremely complex paradigm, which will be difficult to understand and solve if it is only comfortably based on digital modelling, artificial intelligence, Big Data, large economic resources and food surpluses [5, 7]. This paradigm is imbricated by social and political aspects, which are erased by the dehumanisation of the people making up the systems due to the use of digital and technological resources in an issue that requires a broad approach on human values [7]. The systems' resilience approach allows for incursion on aspects and elements that permeate multiple domains, such as social, psychological, physical and information [8]. Nonetheless, the structural, organisational, social and symbolic domains that permeate commercial restaurants and kitchen workers, as a system and subsystem respectively, with focus on the issues of humanisation and the precariousness of work in the industry, have been scarcely investigated.

The theoretical references regarding resilience and aspects in relation to social and symbolic dimensions, respectively, which underpin the analyses presented here, are the two volumes of the International Risk Governance Center (IRGC) Resource Guide on Resilience [9, 10] and the social theory of the French philosopher and sociologist Pierre Bourdieu [11, 12]. In light of Pierre Bourdieu's social theory, which describes the constant dialectics between the individual and the social world as modulators of actions, thoughts and judgements [11], the social and symbolic aspects present in the system (i.e. commercial restaurants) and subsystems (i.e. consumers, managers and kitchen workers) are presented and discussed in this chapter.

The National Academy of Sciences defines resilience as 'the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events' [13]. Food safety resilience in commercial restaurants was conceptualised based on this definition and following the proposition by Linkov et al. [8], which states that to operationalise the concept of resilience, it is necessary to describe the resilience of what, for what and for whom. We propose that the concept of 'food safety resilience in commercial restaurants' is the ability of a system to prepare proactively for an adverse event, whether of immediate scope (e.g. FBD, notifications, complaints or fines) or related to globally imminent crises in health and, in its occurrence, have the knowledge, skill and ability to absorb it, recover and adapt to the new state, ensuring the humanisation of individuals at all stages of the process.

Meal expenses outside home favourably influence the economy of a country and represent a significant part of family spending; however, eating out can present

risks to the consumers' health [14, 15]. The commercial restaurants of interest in the present discussion comprise establishments outside the institutional scope (e.g. companies, schools and hospitals), focusing on self-service, à la carte, fast food and similar modalities.

We understand the need to view commercial restaurants as a large system to characterise their particularities and interconnections with other systems and subsystems. This broad and detailed knowledge has the potential to provide decision-makers with information capable of minimising the vulnerability of places to external and internal shocks. The reference of resilience fits perfectly into this issue, since it seeks to investigate and manage systemic risks that are not easily detected using traditional risk analysis or that have low probability of occurrence but have serious consequences [16].

The objective of this chapter is to present and discuss the commercial restaurant system and the kitchen worker subsystem (i.e. professionals directly involved in meal production) to provide the means for food safety to be humanised, critically rethought, repositioned in the face of the current interconnected scenario of food systems and resilient in the face of imminent disruptive events.

2. Commercial restaurants as a system

The commercial restaurant system anchors three fundamental subsystems: consumers, managers and employees (i.e. professionals directly and indirectly linked with meal production). The system shown in **Figures 1** and **2** summarises the relations established between the system and subsystems. The construction of this system was based on the current scenario of restaurants in the city of São Paulo, SP, Brazil. São Paulo is recognised as the largest Brazilian metropolis with the largest number of inhabitants in the country, and although it is the economic heart of South America's largest economy, holding the largest stock market and sheltering the headquarters for many companies overall Latin American, it has intense socio-economic and socio-spatial inequalities [17, 18].

In its current conformation, this system is governed by competitiveness, in that each restaurant seeks to maintain its reputation and attract more customers than its competitors. To this end, the order of priorities for commercial restaurants is to guarantee tasty meals, cost-effectiveness in the production of each meal, rapid delivery, quality service, an environment that provides a pleasant experience to the consumer and finally, the safety of the food offered. However, the lack of food safety can ruin the image of a restaurant, causing layoffs, fines, notifications or even the closure.

2.1 Consumer subsystem

The consumer subsystem has an extremely relevant role, as consumers' individual or collective decisions regarding food consumption and production have the potential to impact and even drive new practices towards food systems that provide healthy and sustainable meals [3]. However, consumers often do not recognise their role as protagonists within the system. Their order of priorities for choosing the restaurant is tasty meals, cost-effectiveness, service agility, helpful service, pleasant environment and food safety. Consumers have gaps in the knowledge that they can be sources of external contamination of food in restaurants through practices such as coughing,
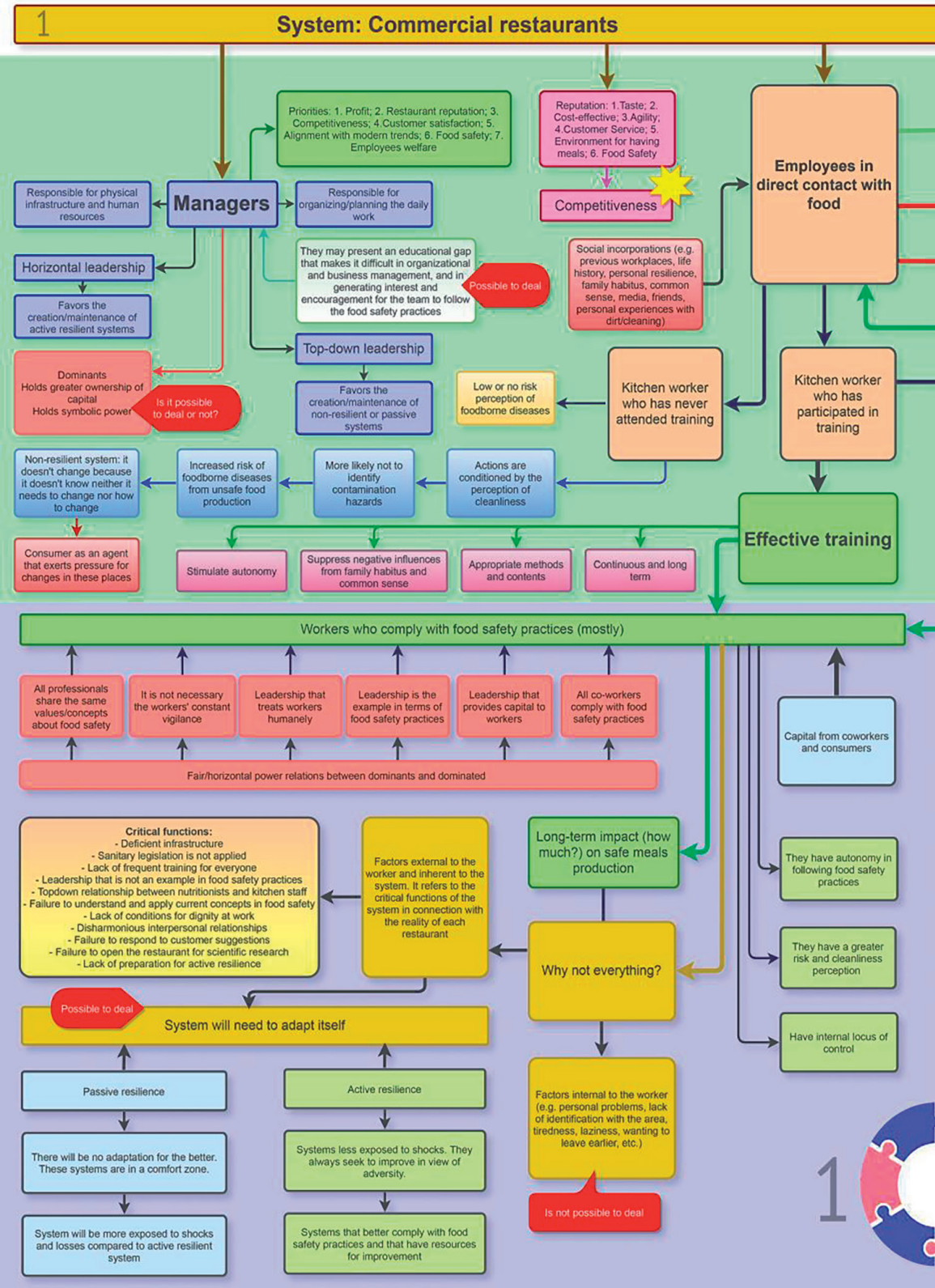
Figure 1.
*Commercial restaurant system map—part 1. For a complete overview, see also part 2 (**Figure 2**).*

sneezing, touching food with dirty hands, among other similar actions, and regarding a broad notion of risky situations and conditions for food contamination presented in sanitary laws. However, in case consumers experience an FBD or witness something that is inconsistent with food safety, they stop going to the place. Although food safety is least prioritised, it is relevant in the determination of the choice of restaurant.
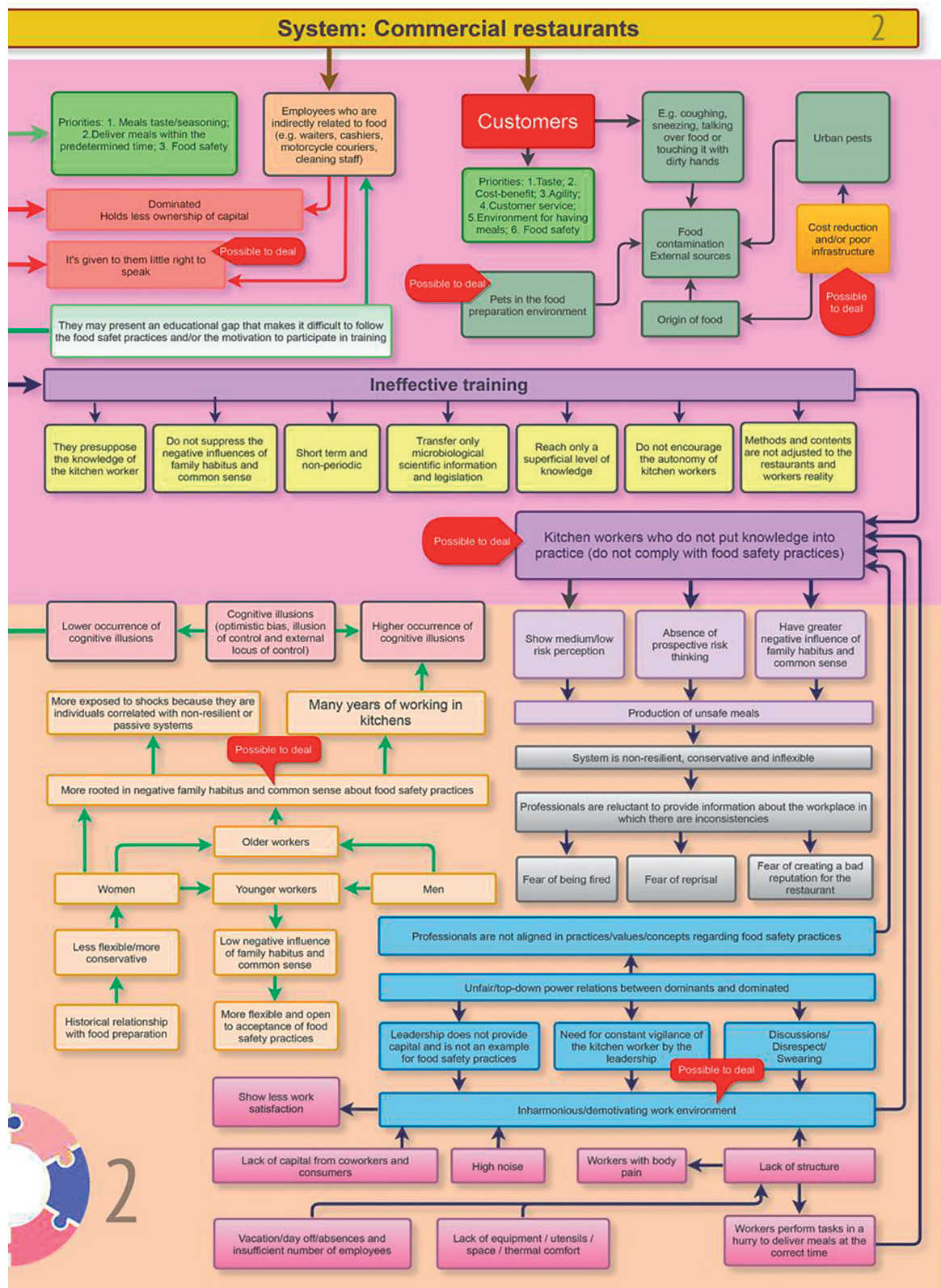
Figure 2.
*Commercial restaurant system map—part 2. For a complete overview, see also part 1 (**Figure 1**).*

We state the need for public policies on food safety to empower consumers as agents of safe practices and advocates for change, through actions that generate knowledge about the impacts of unsafe food on food systems and human health.

Other external sources of contamination, such as the origin of the food, urban pests and the presence of domestic animals in the meal preparation environment,

are likely to affect the systems. It is possible to deal with these sources of contamination that threaten food safety, as the infrastructure and economic resources of restaurants are available for such purposes.

2.2 Manager subsystem

Managers make up the most influential subsystem within the system, as they are responsible for organising and planning daily work, physical structure and human resources. For managers, the order of service priorities is established in the following sequence: profit, restaurant reputation, improving their competitiveness, consumer satisfaction, alignment with modern industry trends, food safety and employee welfare. The leadership style is crucial in building and maintaining resilient systems. Horizontal leadership organises the environment in a collaborative manner, provides improvements based on the opinion of all employees, shares food safety values with the whole team and ensures decent working conditions. This leadership model contributes to building resilient systems, as it recognises that food safety requires investing in employee welfare and workplace harmony.

Educational gaps (e.g. difficulties in interpreting texts, concepts and technical language in their daily application) in this subsystem can negatively influence business management and the work environment, decreasing the incentive to follow food safety practices. It is noteworthy that the education of leaders is a step to be promoted constantly in a way that it covers contents beyond food safety. Themes that can be included to build resilient systems are meal production sustainability, water use awareness in the stages of food preparation, management of food quantities to avoid waste through disposal, use of sustainable packaging, reduction of ultra-processed foods in recipes, full use of food, waste management, conscious use of cleaning materials, food purchase from small producers and local traders, combating precariousness of work in kitchens and humanisation of labour relations.

The social world, governed by visible and invisible structures, permeates the sphere of work with the particularities of family, friend and social class experiences and permanence in several areas. Bourdieu [11] proposes that human beings act, think, appreciate and notice the world through a lens called *habitus*, forged through their life experiences and the characteristics of the social class to which they belong. The social world is full of disputes for power positions, which establish the dominant and the dominated agents. Dominant agents with the largest amount of capital, i.e. concrete or abstract assets that are rare, scarce or valuable in their field (work industry), whether economic, social or cultural, govern the rules of the social space analysed [11]. The leadership is the dominant group, and through the recognition of their capital by the dominated group, they hold the symbolic power in restaurants.

However, the symbolic power relegated to dominant agents in this work industry often reverberates in dehumanising practices for the dominated, i.e. kitchen workers. These dehumanising practices, in terms of treatment, social interaction, guarantee of rights, valuation or recognition of work, undermine any possibility of building resilient systems. Resilience requires initiative and proactivity, as they are needed to develop adaptive systems that can respond to unavoidable events [19], and these elements are not likely to be developed in environments that dehumanise work teams. The question 'is it possible to deal or not?' found in the system map (**Figure 1**), was proposed to raise the problem of the secular social paradigm established between managers and employees (dominant and dominated, respectively) on power issues, with the intention of overcoming it and subsequently achieving a desirable level of system resilience.

2.3 Kitchen worker subsystem

This subsystem comprises highly complex relationships and singularities shaped by social, symbolic, educational, generational, cognitive and motivational aspects that are influenced by social incorporations in previous work, the dimensions of the act of cooking and food safety as millennial practices.

For better understanding, this subsystem has been subdivided into employees who have direct contact with food, i.e. who produce the meals, and employees who do not prepare food, but have indirect contact with it, such as cleaning staff, waiters, motorcycle couriers and cashiers. Both groups have common characteristics concerning the high probability of having educational gaps that hinder the monitoring of food safety practices and the motivation to participate in training in the area and having limited right to speak in their workplaces. Emphasis should be given to the fact that food safety can only be implemented in the foreground when all professionals can collaborate with the construction of food safety values and decisions appropriate to their own social contexts, regardless of their professional position at the restaurant [20]. Resilience must be the base of the pillars of a collective construction that does not scold or punish those who speak out and collaborate with their own work and life experiences. It is understood that on a micro scale (i.e. individual), resilience must operate considering human experiences, rights and well-being [21].

The service priorities of the group of employees who produce the meals are arranged in the following order: taste and seasoning of the meals served, agility to deliver the meals within the predetermined time and finally, food safety. In the Brazilian context, it has been noted that knowledge of food safety, having not been stimulated, presented and reiterated throughout the years of basic education, is outdated, creating a gap for its practical application and the recognition of its relevance.

There are two segments within the aforementioned group: kitchen workers who have never participated in food safety training and those who have already participated. Regarding the former, studies show that their level of knowledge about food safety and hygiene and their perception of FBD risk are low [22, 23]. Risk perception refers to the way people understand the likelihood of adverse events [24]. Safe food handling by the workers of this group is mostly supported by their perception of cleanliness of the premises and food instead of the perception of FBD risk. As a result, there is a greater likelihood of not identifying the hazards that cause FBD, whether chemical, physical or biological, and consequently, a greater risk of FBD.

At this point, we would like to conceptualise and characterise a variant of resilience for the commercial restaurant system, the 'non-resilient'. Non-resilient systems are inflexible and disharmonious environments, which undergo major infrastructural, economic, organisational and social impacts in the occurrence of an adverse event, as they lack the technological, human and financial conditions to improve the aspects that make up their systems. They may find themselves in a scenario of food production within the stipulated schedule, but in conditions wherein food safety is at high risk and working conditions can be precarious and dehumanised. The presence of researchers in the area (e.g. Nutrition, Veterinary Medicine, Biomedicine and Food Engineering) is considered a threat to these systems, which do not seek to improve the quality of meals offered to consumers and fear sanitary inspection acts, as they are aware of their non-compliance with food safety practices. Consumers are the main subsystem that can improve these systems through complaints; however, most are not likely to be addressed because of general system disorganisation, lack of resources and lack of food safety education by leaders and employees.

Systems with kitchen workers who never participated in food safety training do not possess the desired characteristics for building and maintaining resilience.

It is essential to note the complex and interconnected web of relationships between elements and aspects belonging to the segments within this subsystem. Kitchen workers who have participated in food safety training tend to present characteristics consistent with the type of training they have received. Effective training seeks, among its specificities, to be continuous, long-term and appropriate in method and content, and it aims to suppress practices that represent an FBD risk arising from family *habitus*, cognitive illusions and common sense regarding food safety, thus stimulating the autonomy of kitchen workers.

Cognitive illusions lead people to have judgements, perceptions or memories that differ from objective reality and occur involuntarily, being difficult to prevent [25]. Optimistic bias is the manifestation of a positive perspective regarding future events, and with it, a person feels protected from negative events or less susceptible to them [26, 27]. The illusion of control causes people to present an illusory perspective of control over situations that is incompatible with reality [28]. Both illusions have been documented in research with food handlers [29, 30]. Internal locus of control reveals whether a person notices that their actions stem from their own behaviours and not from external agents (e.g. luck, chance, fate, powerful people and superior beings) [31]. Research has shown that the internal locus of control is the most appropriate for kitchen workers, as they can take responsibility for the food safety practices adopted in the preparation of meals, which does not occur when they present an external locus of control [22, 32].

Fair and horizontal power relations between the dominant and the dominated created by the stimulus generated in the work team cause a multiplicity of actions and behaviours that positively influence the incorporation of knowledge regarding food safety practices. Harmonious environments that collectively encourage food safety can present resilience in the face of adverse events.

Symbolic gains have an indispensable role in the spheres of individual and collective behaviour. The recognition given by managers, co-workers and consumers, understood here as capitals of this social space, legitimates the value of the work done. Therefore, the amount of capital possessed by each worker determines the positions in which they are distributed, and it may influence the group regarding leadership in food safety and social support. Humanisation permeates symbolic gains, since recognition is inherent to human identity, and its absence can translate into a form of oppression, self-image depreciation and a reductive way of life [33].

Kitchen workers who receive effective food safety training and apply the knowledge in their daily practice tend to have a long-term impact on safe food production, decreasing the risk of FBD. However, some gaps can still occur in the follow-up of safe practices because of both factors internal to the kitchen worker and factors external to them, which are inherent to the systems. Regarding internal factors, we understand that there are action thresholds, such as personal problems, lack of identification with the restaurant sector, tiredness, laziness and desire to leave early. Uncertainty is one of the crucial elements to understand, study and manage risks [34]. Uncertainty associated with the reference of resilience, especially regarding the flexibility of systems, helps understand that it is not possible to have total control of all risks and that adaptations are necessary [8]. Acknowledging the existence of these factors strengthens the means for decision-makers to adjust their actions, practices and training modes to anticipate adverse events that may arise from human limitations relevant to the area.

External factors are correlated to critical functions adjusted to the reality of each place that can result in shocks to commercial restaurant systems. The critical functions identified so far are deficient infrastructure, failure to follow the rules in the sanitary legislations, lack of frequent training for all workers in the system, leadership that is not the example to be followed in food safety practices, top-down relationship of nutritionists with employees, lack of understanding and use of current food safety concepts, lack of conditions conducive to dignity at work, disharmonious interpersonal relationships, lack of response to consumers' suggestions, lack of openness towards scientific research in the place and lack of planning and preparation for resilience.

While recognising the existence of critical functions of structural, organisational, social and symbolic orders, which hinder the construction of resilience, it is also realised that systems need to adapt because of their own characteristics, aiming at better preparation and planning for adverse situations.

Given this fact, two models of action for resilience can be implemented, the passive or the active. Martin [35] conceptualises two types of resilience in view of the referential of safety and risk. Passive resilience is established in the absorption of adverse events, rapid recovery and return to the state of normality or usual functioning, while active resilience, as an improvement, seeks to become stronger with the learning provoked by adversity, generating greater capacity to deal with future disruptive events [35]. Based on this reflection, we developed conceptualisations applied to food safety in commercial restaurants, which are as follows:

Passive resilience: Passive resilience is present in commercial restaurants in which no adaptations to improve the elements and practices are implemented after the adverse event, even though recovery occurs. Meal preparation happens within the stipulated period, but safe practices in food safety are not applied in most of them. A certain accommodation of the individuals of these systems is identified since the meals are delivered without major procedural difficulties, and there is no charge by formal agencies regarding full compliance with safe practices. In these environments, social relations between kitchen workers and managers are often conflicting, and there is no openness to conduct research because of the insecurity generated by the environment. In these restaurants, consumers act as the main agents capable of promoting changes related to food safety.

Active resilience: Commercial restaurants that are active resilient systems have high capacity to recover from and adapt to adverse events. They become consolidated in systems that are more flexible and open to changes that result in food safety and workers' well-being. As a result, there is greater work organisation and higher level of alignment in structural, formative and interactional issues. Active resilience represents the ideal conditions of this type of system. In the occurrence of an adverse event, the restaurants that present this variant recover more quickly, which demonstrates that they have learned and are in better conditions to respond to new adverse events.

In the restaurant context, passive resilience is preferred over non-resilience. However, when active resilience is experienced, restaurants tend to be less vulnerable to internal and external shocks that can disrupt normal functioning generating negative effects on the economy of the place, on workers and on the consumers' health. Hence, it is recommended to manage systems with the construction of active resilience as an objective.

Studying kitchen workers who have participated in ineffective training has shown that it is, among several characteristics, unable to suppress negative influences on

food safety arising from family *habitus* and common sense, not periodic and constant, focuses only on passing microbiological scientific information and legislation, reaches a superficial level of knowledge and does not stimulate the autonomy of kitchen workers. They present medium to low-risk perception, absence of prospective risk thinking and greater influence of actions inconsistent with safe practices found in common sense and family *habitus*, such as defrosting at room temperature, reusing leftovers of ready-to-eat food, prolonged exposure of food to room temperature and not disposing of possibly contaminated food.

Moreover, restaurants wherein this scenario is a reality are highly likely to present a 'non-resilient' system, with characteristics of conservatism and inflexibility. These social spaces indirectly cause the suppression of kitchen workers' right to speak about their working conditions and food safety, for fear of losing their job, reprisals or generating a bad reputation for their workplace.

A disharmonic or non-motivating work environment, an aspect that can be changed during the preparation stage for the construction of active resilience, combines inappropriate and unfair conditions between leaders and employees, conflicts, swearing and disrespect among the team and the lack of shared values, practices and concepts in food safety from all those present in the workplace. Disharmonic or non-motivating environments dehumanise workers and cause precarious working conditions since job satisfaction is insufficient, and they have poor infrastructure (i.e. lack of equipment, utensils, space to work, thermal comfort, insufficient number of employees and high noise levels), which can lead to pain and occupational diseases [36, 37]. Furthermore, it is possible to find workers hurrying to meet the schedule for finishing the meals because of the lack of structure, which makes them more susceptible to errors, work accidents and the non-performance of steps essential to food safety.

Throughout the text, and also indicated on the system map (**Figures 1** and **2**), situations in which changes can be made and situations that are difficult to access because of their individual and particular character are highlighted. This holistic and integrated view of elements, factors and aspects enables decision-makers, policy makers and leaders of each system to identify the vulnerabilities present either on a micro (e.g. subsystems) or macro scale (economic sector of out-of-home meals and public health), contributing to food safety and food security in food systems.

3. Social and subjective aspects of the kitchen worker subsystem

Considering its high complexity and multiple singularities, a subsystem map (**Figure 3**) was developed to facilitate the visualisation of the elements pertinent to this subsystem. Only the aspects that have not yet been presented in the system will be depicted.

Meal taste and seasoning have been established as a priority of effort and commitment from the perspective of the kitchen worker. Culinary knowledge comes from the culture of each nation and region passed on from generation to generation and transposed to the *habitus*. The social dimension of taste incorporates the *habitus* with food-related family practices and taste elements characteristic of each social class, reflected in lifestyle and preferences regarding product and food use and consumption [12]. Knowledge exchange between individuals in the restaurants they work or have worked for enables cultural exchange, enriching the result of the meals and the learning of practices that can help or hinder food safety.
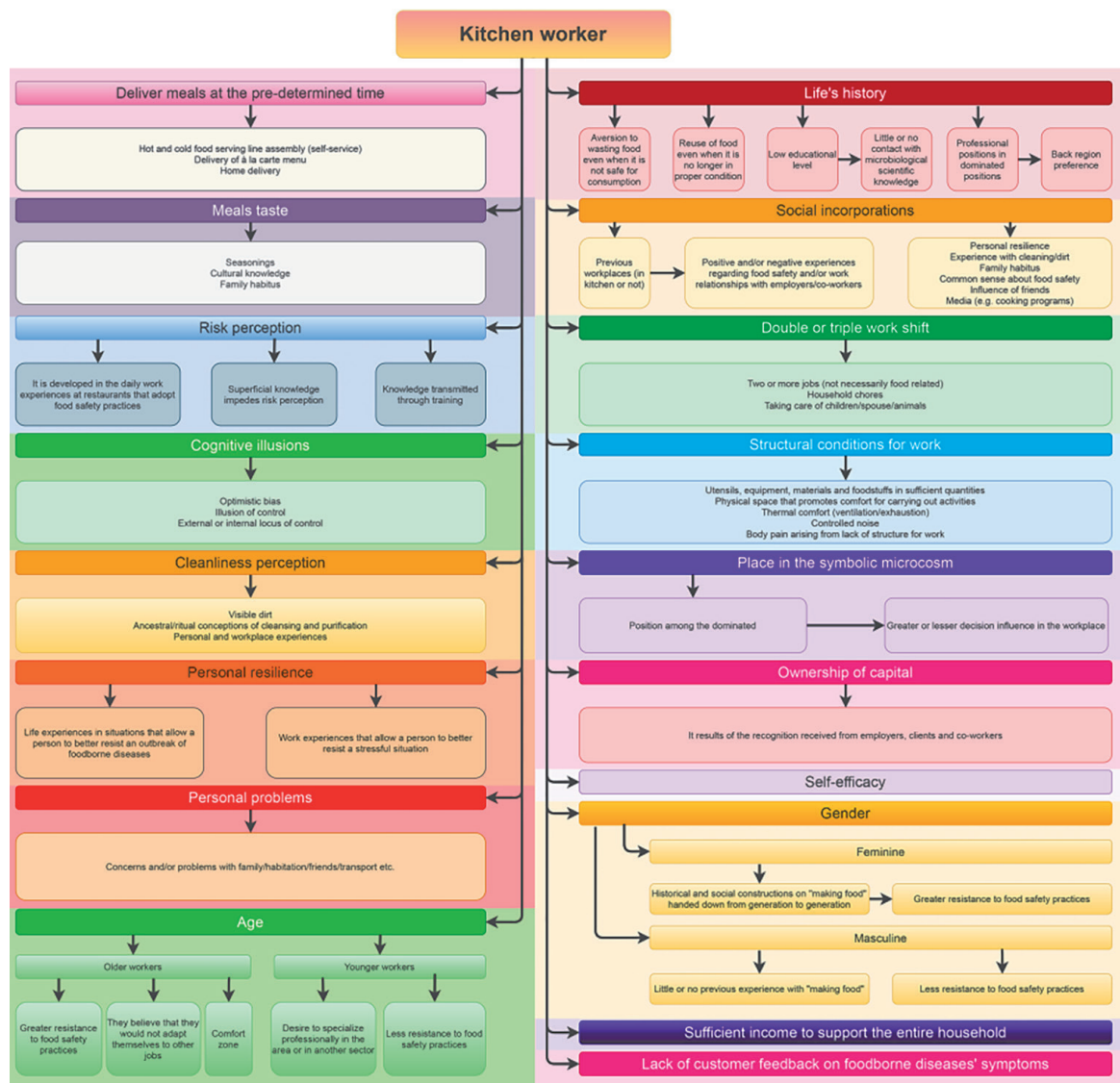
Figure 3.
Kitchen worker subsystem map.

The perception of cleanliness in the work environment and of oneself also acts as a guide for these practices, being shaped in the aforementioned basis and in the referential of dirt and cleanliness (i.e. purification) ancestrally brought by diverse cultures to culminate in what is now understood as hygiene [38, 39].

Self-efficacy, the foundation of human action, refers to how much a person believes in their own ability to control to some extent their functioning and that of the environment, reaching spheres of motivation self-regulation through result expectations [40, 41]. It is believed that self-efficacy can modulate kitchen workers' food safety practices as they envision benefits to consumer health, reducing multiple harms in their workplace and maintaining their jobs. Self-efficacy, when developed favourably, tends to reduce vulnerability to stress and depression and strengthen aspects of resilience in the face of future adversity [41]. In a personal scope, resilience is defined by the Oxford Advanced American Dictionary as 'the ability of people or things to feel better quickly after something unpleasant, such as shock, injury, etc.' [42]. In the context of commercial restaurants, personal resilience is built owing to life and work experiences that enable kitchen workers to better withstand and recover to respond satisfactorily to the occurrence of an FBD, shocks of any order and stressful situations. In a systemic

way, micro (individual) and macro (systems) scale resilience are interrelated, and it is not possible to dissociate or compartmentalise them, since one affects the other.

Considering the precariousness present in the meals production sector, it is common to observe kitchen workers having double or triple shifts in order to ensure the livelihood of their families. These shifts can be composed of another work shift, temporary activities related to food production or in another sector and household and family care activities. It is necessary to emphasise that the political and employment scenarios affect the workload and quality of life of these workers. In addition, in the Brazilian context, this group is composed of people from low-income social classes, who often face the lack of adequate housing conditions, urban transport problems and difficulties in health care, among others. Such facts constitute the sphere of concerns that inhabit their daily lives and influence the structure that would be suitable for their full development and performance as workers. In food safety, resilience is also interconnected with broader national scenarios.

The life history of kitchen workers can also influence food safety decisions. Living in situations with food insecurity tends to generate resistance towards discarding food that is not in proper condition for consumption. Making an analysis based on the studies of the anthropologist and sociologist Goffman [43], kitchen workers often dislike interaction with the public, maintain a distance and are shy, which reflects in their preference to work in the back region (i.e. the kitchen) rather than expose themselves to judgements or false performances in the front region (i.e. the dining area with consumers), a fact which is also a product of their social position.

Finally, gender and age issues regarding kitchen workers are relevant in identifying obstacles to food safety practices. Older workers in the sector show an inclination to maintain the *status quo* of their practices, i.e. they are more resistant to changes proposed in view of food safety updates. This tends to occur because of the consolidation of a professional *habitus* throughout the years of their professional experience. Furthermore, because of their social position, they report that they consider themselves incapable of adapting to other jobs, performing functions that are not related to meal production [44]. Male and young workers are usually less resistant to changing their practices, both for being less influenced by the matriarchal reference to meal preparation and for having little or no previous experience with cooking. Knowing these facts enables the designing of strategies aligned to the needs of each profile, aiming to overcome socially constructed barriers and foster new practices for the construction of active resilience.

4. Recommendations for building food safety resilience in commercial restaurants

Table 1 lists recommendations that can improve the development of public policies, legislation and guidelines for the meal production sector to contribute to the construction of active food safety resilience.

The recommendations to build food safety resilience in commercial restaurants are intended to promote the absorption, recovery and adaptation capacity of the systems in the occurrence of adverse events through preparation and planning at multiple levels of dimensions involving people, structure and organisation and by considering the interconnections with sustainability needed in the area. The steps of absorption, recovery and adaptation tend to occur in a more agile and collaborative manner when the people involved in the systems understand the scope of action required to build active resilience and put efforts to achieve it in their daily work practice.

Recommendations for building food safety resilience in commercial restaurants
To provide all workers who make up the system with continuous education that is appropriate to their educational, management and food safety needs
To enable a work environment in which workers can exercise the right to speak without reprimands
To listen to all work team for collective decision-making on food safety organisation, planning and preparation
To share food safety and sustainability values with the entire team, aligning concepts on these topics
To stimulate means to make leaders, in micro or macro scale, a food safety example to be followed to motivate similar behaviour in the team
To provide structural and organisational means to implement food safety practices in the daily working routine
To make efforts to kitchen environments maintain horizontal relations between all positions, based on dialogue and qualitative listening regarding multiple needs and experiences
To combat the precariousness of the meal production sector through decent working conditions
To humanise relations between professionals in all positions based on respect for individuality, appreciation of their work and recognition of the importance of everyone's voice in collective decision-making in food safety
To periodically investigate the system and subsystems for possible vulnerabilities concerning critical functions and new situations that may emerge
To have work plans for resilience preparedness and FBD prevention adapted to the reality of the systems and updated face of relevant changes, without being bound by time frames
To have a vision of the interconnection of systems (field production, food service production, storage, transport, distribution, water resources, environmental preservation, etc.), implementing actions that ensure sustainability at all stages
To become aware that the use of financial resources in measures or infrastructure to ensure food safety is proactive action to prevent financial and other losses to the systems
To develop guidelines and training in food safety that include not only microbiological aspects and sanitary legislation, but also cultural practices and experiences in preparing safe meals in the context of social interaction (i.e. with family, friends, celebrations, common sense, etc.) to contextualise these guidelines
To encourage interdisciplinary research allied to human sciences, which will focus on understanding the factors identified in **Figure 1** as 'is not possible to deal'
To encourage research on resilience in interconnected systems: food purchase, transport, distribution and other systems

Table 1.
Recommendations to build food safety resilience in commercial restaurants.

5. Conclusions

The concepts, elements, factors and knowledge that make up food safety resilience in commercial restaurants point to the fact that its construction needs to be based on a strong foundation to guarantee fair and appropriate conditions for working, learning about food safety and sustainability, humanising interpersonal relationships between professionals and providing an environment that facilitates collective decision-making regarding food safety and its daily application.

As subsystems, consumers, managers and kitchen workers contribute according to their dispositions, capacities and perceptions to mitigate or intensify FBD risks and to create decent working conditions. One of the central characteristics of risk is uncertainty, which permeates the decisions of these three subsystems that can engage in building active resilience through their choices.

When considering resilient food systems that are capable of withstanding adversities, the interconnected systemic vision is the most capable of promoting preparation and planning, as it ensures food safety, food security and sustainability in its broad aspects and particularities.

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Conflict of interest

The authors declare no conflict of interest.

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Author details

Rayane Stephanie Gomes De Freitas[1] and Elke Stedefeldt[2]*

1 Postgraduate Program in Nutrition, Universidade Federal de São Paulo, São Paulo, Brazil

2 Department of Preventive Medicine, Universidade Federal de São Paulo, São Paulo, Brazil

*Address all correspondence to: elke.stedefeldt@unifesp.br

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