Research Paper

Future of Food: Journal on Food, Agriculture and Society
9 (5) December 2021

Food Rescue and Donation in Socioenvironmental Policies on Tackling Food Loss and Waste: a Systematic Review

MÔNICA YOSHIZATO BIERWAGEN[1]*, SYLMARA LOPES FRANCELINO GONÇALVES DIAS[1]

[1]School of Arts, Sciences and Humanities, University of São Paulo - USP, São Paulo, Brazil.

* Corresponding author: moyobi@usp.br

Data of the article

First received : 05 December 2020 | Last revision received :29 September 2021
Accepted : 25 November 2021| Published online :20 December 2021
DOI : 10.17170/kobra-202110144896

Keywords

food rescue, food donation, food security, food loss and waste food wastage

In recent years, there has been an increasing concern among governments about Food Loss and Waste (FL&W), and, in this context, the Food Rescue and Donation (FR&D) has emerged in the socio-environmental policies scenario as a strategy for FL&W reduction. Even though FR&D has the potential to establish a "win-win" arrangement between the spheres of waste management and demands of food security, it still has been perceived as a less attractive alternative than forwarding the surplus food to the waste treatment systems. Thus, this paper aims to understand what the practice of FR&D consists of and identify its limits and possibilities for inclusion in socio-environmental policies. A systematic literature review was undertaken from January to April 2020 (Scopus database) and September 2021 (Web of Science database), focusing on scientific papers. Conducted under the PRISMA Statement recommendations, 42 articles were scrutinised. The results suggest most authors and studies on FR&D are from developed countries, although food insecurity is more often present in developing countries. Furthermore, a conceptual scan was carried out to explain what the practice of rescue is and define its object. It was concluded that, despite the apparent "win-win" solution, integrating FR&D and encompassing food security and solid waste management, the study unveiled contradictions that deserve further and deeper investigations on its effectiveness as a socio-environmental policies tool.

1. Introduction

In recent years, Food Loss and Waste (FL&W) has been an increasing concern to governments, and in this context, Food Rescue and Donation (FR&D) has emerged as a strategy for FL&W reduction. Even though FR&D has the potential to establish a "win-win" arrangement between waste management actions and the demands of food security (i.e., to ensure the decrease of hunger and malnutrition amongst socioeconomically vulnerable populations, as compromised by SDG 2 [1]), FR&D still has been a less attrac-

[1] Sustainable Development Goal 2. In 2015, the General Assembly of United Nations, by Resolution 70/1, adopted the 17 Sustainable Development Goals – SDGs and 169 targets as a part of the 2030 Agenda for Sustainable Development. The SDG 2 states Zero Hunger as a goal to be achieved by 2030.

tive alternative than disposing of the surplus food in the waste treatment systems (Aiello, Enea, & Muriana, 2015).

This is a puzzling situation because even though there is not an international consensus, the Food Waste Hierarchy from the US Environmental Protection Agency (US EPA) suggests food recovery for human purposes as preferable than waste treatment (EPA, [s.d.]). The "paradox of scarcity in abundance" (Rovati, 2015) highlights serious dysfunctions in modern food systems, which waste a significant quantity of food, despite the contingent of dependents on food donation systems being on the rise, even in developed economies. FR&D, in this scenario, can contribute to the immediate relief of food insecurity problems and the prevention of waste. However, once it is a strategy that faces only the consequences, but not the causes of FL&W, it has limitations that must be considered when designing and managing public policies.

Therefore, this study aims to understand what the practice of FR&D consists of and identify its limits and possibilities for inclusion in socio-environmental policies. For that, it will attempt to answer the following questions: What is FR&D, and how does it operate? To which extent may FR&D be embedded in socio-environmental policies, especially to promote integrated solutions for solid waste management, FL&W, and food insecurity?

A systematic literature review was carried out utilising the PRISMA Statement (Moher et al., 2009). Systematic reviews are beneficial, both theoretically and practically, once by collecting and organising data under a transparent and reproducible scientific process, biases are minimised, and thus greater security in information produced is achieved (Tranfield, Denyer, & Smart, 2003).

The literature review was planned and carried out according to the following steps: definition of procedures for collection and selection of papers (Section 2, "Materials and Methods"); identification and presentation of the main findings in the selected literature (Section 3, "Results"); and a critical and articulated analysis of the results (Section 4, "Discussion").

By having completed all these phases, it was possible to conclude that the concept of food rescue is primarily associated with the idea of preventing surplus food from becoming waste and being destined for the treatment system (Aiello, Enea, & Muriana, 2015; Bilska, Wrzosek, Kołozyn-Krajewska, & Krajewski, 2016; Busetti, 2019), and once it is suitable for human consumption, it should have the purpose of feeding people affected by food insecurity (De Pieri, Tallarico, Baglioni, Soler, & Ricciuti, 2017; Hecht & Neff, 2019; Mousa & Freeland-Graves, 2017; Reynolds, Piantadosi, & Boland, 2015; Vlaholias, Thompson, Every, & Dawson, 2015a).

Furthermore, considering the extent of integrating the FR&D into socio-environmental policies to fight FL&W, observed that the alleged complementarity of measures against food insecurity and prevention of solid waste as a "win-win" solution is more intuitive than real (Arcuri, 2019; Kinach, Parizeau, & Fraser, 2019; Warshawsky, 2016; Vlaholias, Thompson, Every, & Dawson, 2015b).

2. Materials and Methods

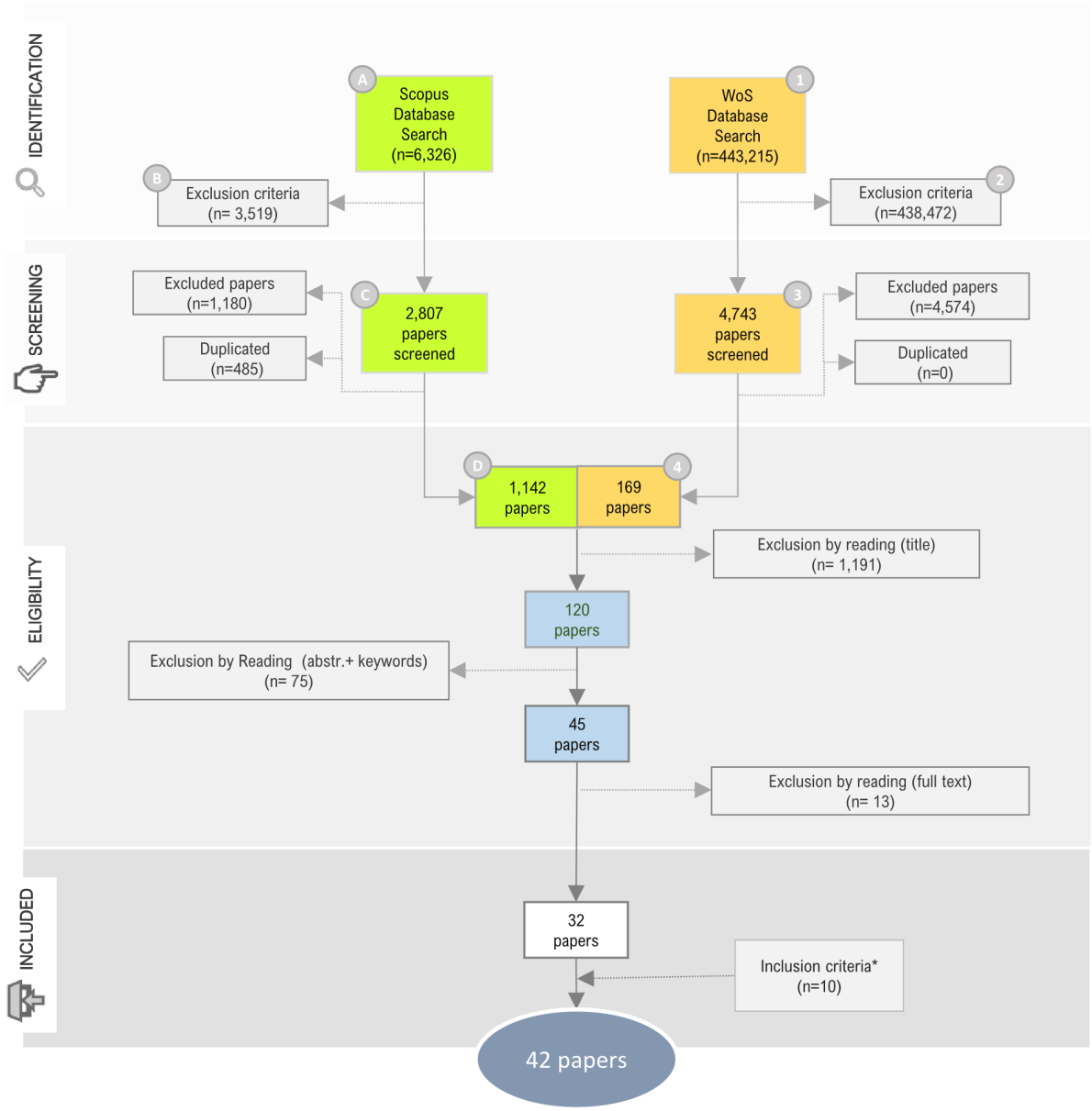
Following the PRISMA Statement recommendations, to select the most relevant scientific papers, a search on the Scopus database was carried out in 2020 from January to April, and on the Web of Science data base, in September 2021. Figure 1 shows the papers selection process according to the PRISMA Statement.

The following protocol shows a complete process of steps carried out[2]:

1. Starting with the Scopus database, a broad search with few search key terms was performed, enabling a first exploratory approach on the literature. In the "Identification" phase (letter "A" in Figure 1), 6,326 titles were found. By applying a filter with several terms that certainly would not be related to the proposed objective (letter "B" in Figure 1), 3,519 titles were excluded; thus, 2,807 papers were left.

2. In the "Screening" phase, based on previous readings on the topic, terms identified as usual in the literature about FR&D were used as criteria for further selecting works. Applying this criterion in the "search within results" field, a set of 1,627 titles was obtained (letter "C" in Figure 1). From this, 485 were excluded by repetition, then 1,142 papers were left (letter "D" in Figure 1).

ISSN-Internet 2197-411x OLCL 862804632



SEARCH CRITERIA:

A **Key terms for selection (by title, abstract and keyword)**: food* and donat* or donor*

1 **Key terms for selection (by title, abstract and keyword)**: food* and donat* or donor*

B **Key terms for exclusion (by title, abstract and keyword)**: not blood* and not cell* and not transufsion* and not hiv and not hepatitis and not milk* and not breast* and not disaster* and not refug* and not diet*

2 **Selection criteria**: document type (article, book chapter, conference paper, paper review) and WoS categories (food science technology, environmental sciences, nutrition dietetics, agronomy, ecology)

C **Key terms for selection (by title)**: rescu* or bank* or recover* or secur* or surplus*

3 **Key terms for selection (by title)**: food and donat* or (rescu* or waste* or loss* or recover* or surplus* or insecur* or secur* or safe*)

D **Outcome of Screening Phase (Scopus):** 1,142 articles

4 **Outcome of Screening Phase (WoS):** 169 articles

* Articles withdrawn based in exclusion criteria in latter phases, or not retrieved by the search, but previosly known by the authors, both relevant for the study.

Figure 1. Papers selection process

3. An analogous procedure was performed within the Web of Science – WoS database search. The "Identification" phase started with a broad search that resulted in a set of 443,215 articles (number "1" in Figure 1). These articles were filtered by the search criteria provided by the WoS platform, using the document type field and the "WoS categories" field, which entailed the exclusion of 438,472 articles and 4,743 papers left (number "2" in Figure 1).

4. In the "Screening" phase, a Boolean search in the title field provided the exclusion of 4,574, thus remaining 169 papers (number "3" in Figure 1).

5. In the "Eligibility" phase, the papers left from Scopus and WoS were joined in one single list of 1,311 articles. A careful reading of the titles resulted in the exclusion of 1,191 papers. The 120 remaining papers were appraised by reading the abstracts [3], and 75 of them were withdrawn. The 45 remaining were then submitted to a full reading that excluded of 13 of them.

6. To the 32 articles sent to the "Inclusion" phase, 10 others were added [4], totaling 42 papers to the analysis.

3. Results

In order to consistently organise the findings from the set of studies of this review, an exploratory perspective was adopted, and the following aspects were analysed: (I) frequency of the main topics amongst the empirical studies; (II) co-occurrence of topics in the papers related to FR&D; (III) geographic location and origin of the study, considering the first author or research centre.

The number of empirical (experimental or observational) studies is significant. Amongst all 42 selected papers, 29 were empirical, and only 2 were systematic reviews. Analysing the set of 29 empirical studies it was possible to categorise them considering the main topic focused on: food loss (from production to distribution); food waste (from retail to final consumption); legislation and public policies; and food donation programs/food banks/food donation networks. The quantitative superiority of papers on food waste is significant compared to the studies on food loss. Considering the studies that evaluated losses in relation to the stage in the food chain, the number of articles on waste in the retail-consumption phase is approximately twice as large as that one dedicated to the production-distribution phase, as seen in Figure 2.

Such outcome partially confirms, as it has already been pointed out in previous studies, that in developed countries, the rates of food waste are higher than of food loss, whereas, in developing countries, this ratio is reversed: the rates of food loss are higher than food waste (Gustavsson, Cederberg, Sonesson, Otterdijk, & Meybeck, 2011; HLPE, 2014)[5] .

In this sense, by crossing the topics "food loss", "food waste", "food security" and "food safety"[6], it was found that most of the selected studies have focused on the association of food security and food waste (54.23%), and food security and food loss (42.38%), whereas there are very few studies addressing food safety and FL&W (Table 1). This gap deserves some attention, particularly considering that food donation often occurs near the end of shelf life (De Boeck, Jacxsens, Goubert, & Uyttendaele, 2017), and comprises perishable food (including time and temperature controlled) (Bierma, Jin, & Bazan, 2019; Koutsoumanis et al., 2018), situations that sanitary and safety issues become more worrisome.

Finally, it was observed that 12 publications had shown Italy as the country the object of research be-

[2] This is a second amplified version of the protocol, redesigned after the reviewers' comments.

[3] Criteria for excluding papers by reading the abstract: two sets of keywords were created with words related to food waste management (food loss, food waste, waste prevention, waste management, surplus food, loss of products, prevention, food recovery, wasteful, excess food, waste minimization, environment, landfill, reuse, sustainability, land use, methane production) and to food security and food safety (food security, food poverty, donation, redistribution, nutritious food, social purpose, food safety, hungry, people in need, good Samaritan, social exclusion, food charity, charity, charitable food, undernourished, food bank, food aid, food overproduction, legal liability, redistribution, food assistance). To be eligible, the abstract must comprise at least one word of each set, simultaneously.

[4] In the "Included" phase, 8 of them were papers excluded by applying the criteria performed in previous stages of the selection process (e.g.: a paper that would be excluded by reading the abstract), which has returned to the corpus for their relevance to the objectives of this research. Two of them were papers not retrieved by the search, but previously known by the authors and included for its relation to the topic.

ISSN-Internet 2197-411x OLCL 862804632

longs to, followed by the US (n=7), both corresponding to nearly half of all collected studies for this review. Likewise, a large number of articles have had their first authors associated with Italian (n=12) and American (n=6) research institutes (Figure 3).

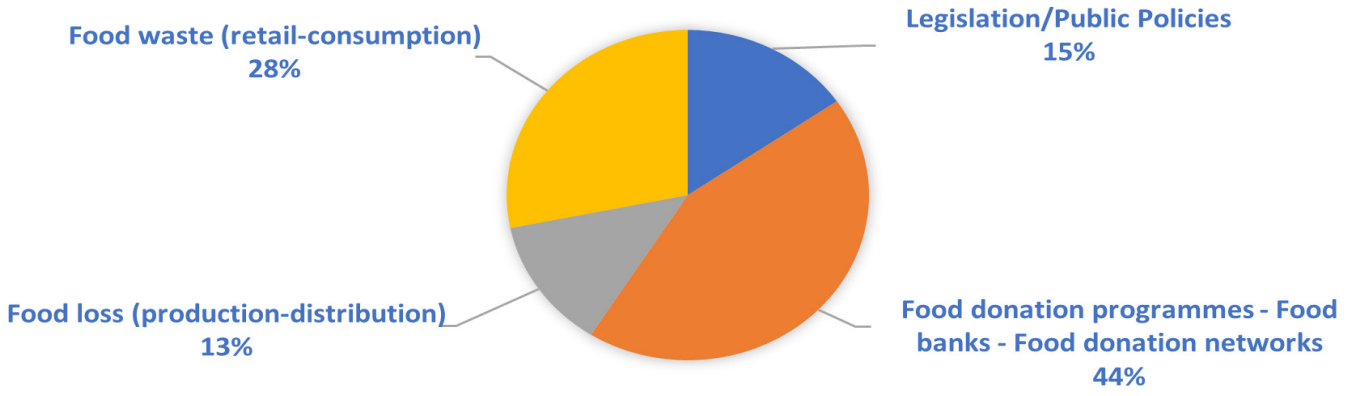


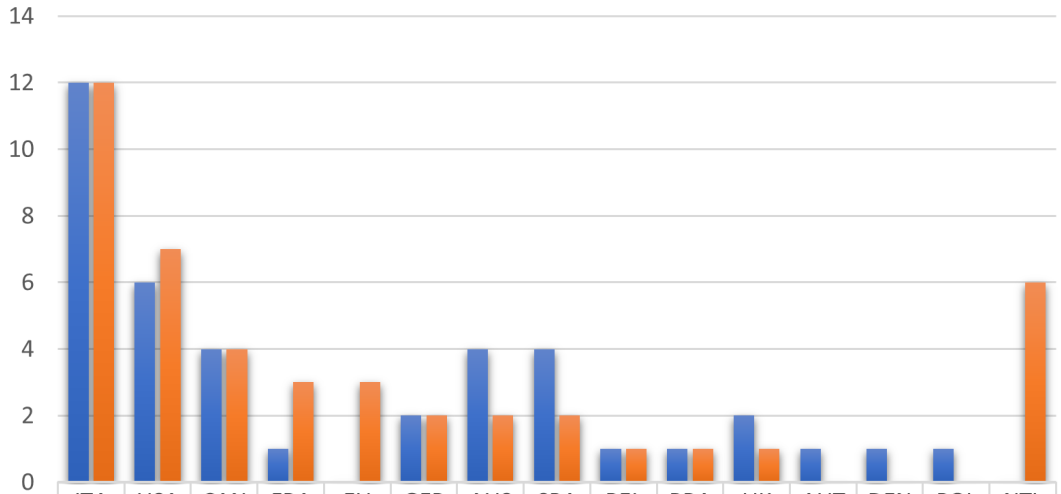
Figure 2. (I) Frequency of the main topics amongst the empirical studies

Table 1. (II) Co-occurrence of topics in the papers related to FR&D

Waste Management / Hunger Malnutrition	FOOD LOSS	FOOD WASTE
FOOD SAFETY	0%	3.39%
FOOD SECURITY	42.38%	54.23%

[5] Brazil is an exception to the rule, as it has large food losses in the production phases, as well as a significant volume of food waste, especially among consumers (Porpino, Parente, & Wansink, 2015).

[6] Food safety regards procedures to cautioning the risk of foodborne illnesses, and in this sense, it may be considered part of food security. Nonetheless, in some FR&D papers food safety is focused as an independent topic (Bierma, Jin, & Bazan, 2019; De Boeck, Jacxsens, Goubert, & Uyttendaele, 2017; Koutsoumanis et al., 2018; Milicevic et al., 2016), so it was considered useful to count them separately. Food loss/food waste is also a widely used dichotomy in the literature to address the decrease in quantity or quality of food from post harvesting up to storage, and from retailing up to consumption, respectively.



	ITA	USA	CAN	FRA	EU	GER	AUS	SPA	BEL	BRA	UK	AUT	DEN	POL	NTL
1st. author	12	6	4	1	0	2	4	4	1	1	2	1	1	1	0
country (research object)	12	7	4	3	3	2	2	2	1	1	1	0	0	0	6

NOTE: FRA (France), ITA (Italy), USA (United States), CAN (Canada), UK (United Kingdom), AUT (Austria), BEL (Belgium), SPA (Spain), AUS (Australia), BRA (Brazil), GER (Germany), DEN (Denmark), POL (Poland), EU (European Union) and NTL (no territorial link)

Figure 3. (III) Origin of the first author and country of research

Regarding the country that the research object belongs to, there is almost a complete absence of approaches comprising the reality of developing countries;in the group of 29 articles, there was only one study about Brazil (Henz & Porpino, 2017). This disproportion is also observed when considering the first authors' institutes (Figure 3).

4. Discussion

The combination of measures to tackle food insecurity as well as to fight FL&W is intuitively assigned to a "win-win" situation: food, which would become waste and would be forwarded to the landfill due to dysfunctions in the food system, could be rehabilitated to fulfill its original function, i.e., human consumption. Despite that, FR&D has been a less-used alternative compared to the surplus food forwarded to the waste treatment systems (Aiello et al., 2015). This situation demands a better understanding of alternatives that ensure the most effectiveness of FR&D.

An aspect that must be highlighted refers to identified gaps in the literature: the lack of studies to measure the profitability of food recovery (Aiello, Enea, & Muriana, 2015; Albizzati, Tonini, Chammard, & Astrup, 2019; Reynolds, Piantadosi, & Boland, 2015), the cost of waste (Garrone, Melacini, & Perego, 2014; Phillips, Hoenigman, Higbee, & Reed, 2013), tax benefits (Garrone, Melacini, & Perego, 2014), and the environmental taxes of the rescue (Albizzati, Tonini, Chammard, & Astrup, 2019).

Authors also point out that there is a lack of studies on improving the efficiency of FR&D programs (Lee, Sönmez, Gómez, & Fan, 2017) and their impacts on food poverty, food insecurity, or hunger (Bazerghi, McKay, & Dunn, 2016; Phillips, Hoenigman, Higbee, & Reed, 2013).

Regarding methodological issues, there are voids in the scientific literature assessing and comparing the effectiveness of different models of food rescue (Hecht & Neff, 2019) and collecting data on food waste (Mousa & Freeland-Graves, 2017; Warshawsky, 2016). Also, there is a scarcity of studies that link food safety to local donation networks, or to the role of local health workers (Bierma, Jin, & Bazan, 2019).
Although such gaps deserve attention and provide an interesting range of possibilities for studies and re-

ISSN-Internet 2197-411x OLCL 862804632

search to deepen the knowledge on FR&D, it is noteworthy that such voids do not hamper the authors from pointing out advantages and showing critical aspects of the FR&D, which may help to understand why sending surplus food to the treatment system is still the most common option.

4.1. Food rescue and rescued food: conceptual framework

One of the aspects that stands out in the selected studies refers to the terminology used to refer to both the activity (food rescue) and its object (the rescued food), as well as the meanings attributed to such terms. Accordingly, besides "food rescue" (Hecht & Neff, 2019; Reynolds, Piantadosi, & Boland, 2015), the studies have expressions such as “food rescue nutrition” (Mousa & Freeland-Graves, 2017),"food redistribution” (Albizzati, Tonini, Chammard, & Astrup, 2019; Vlaholias, Thompson, Every, & Dawson, 2015a) and "food recovery” (P.L. González-Torre & Coque, 2016).

The literature also records the expressions like “rescuable food” (Hecht & Neff, 2019) and "surplus food" (Albizzati, Tonini, Chammard, & Astrup, 2019; Alexander & Smaje, 2008; Garrone, Melacini, & Perego, 2014; Sert, Garrone, Melacini, & Perego, 2015) to name what is subjected to the rescue. In a broader sense, surplus food can also comprise, in addition to "edible food", which means food of good quality and safe to be consumed, the “inedible food”, which addresses parts culturally not recognised as “food”, such as skin, stems, seeds, leaves (Hecht & Neff, 2019).

Although Hecht and Neff (2019), Reynolds, Piantadosi, & Boland (2015), and Vlaholias, Thompson, Every, & Dawson (2015a) use the term "food recovery" as synonymous with "food rescue," it is noteworthy that the term "recovery" is not used to re-establish a situation or a previous state: utilisation always occurs before the food becomes waste. In this context, the “wastage” is surplus food not used to feed people (Garrone, Melacini, & Perego, 2014) and it is identified by expressions such as "food loss” (Aiello, Enea, & Muriana, 2015; De Boeck, Jacxsens, Goubert, & Uyttendaele, 2017); ;); "food waste" (Albizzati, Tonini, Chammard, & Astrup, 2019; De Boeck, Jacxsens, Goubert, & Uyttendaele, 2017); Foti, Sturiale, & Timpanaro, 2018; Garrone, Melacini, & Perego, 2014; P. L. González-Torre & Coque, 2016; Kinach, Parizeau, & Fraser, 2019); “food loss and waste ” (Kinach, Parizeau, & Fraser, 2019); “food wastage” (De Boeck, Jacxsens, Goubert, & Uyttendaele, 2017) and “wasted food” (Foti, Sturiale, & Timpanaro, 2018).

4.2. Rescue of food in the integration of policies to tackle waste and promote food security: limits and possibilities

As FR&D is recognised as a strategy that helps both raise the quality of life of those who have inefficient access to food and improve waste management systems efficiency, it´s not free from criticism and disagreements.

The reactions, ranging from "apoplectic" to "enthusiastic" (McIntyre, Patterson, Anderson, & Mah, 2017), are based on several motivations and grounds: highlighting the paradox of coexistence of food insecurity and waste, FR&D has been recognised as an ethical (Thyberg & Tonjes, 2016) or a morally acceptable solution (Lee, Sönmez, Gómez, & Fan, 2017; Rovati, 2015; Sakaguchi, Pak & Potts 2018; Sert Garrone, Melacini, & Perego, 2018; Tarasuk & Eakin, 2003).

However, from a political approach, Mura, Castiglioni, Borrelli, Ferrari, & Diamantini (2019) have problematised food donation from the concept of “food justice” - as an impossibility for low-income people to access high quality and healthy food. These authors emphasise the risk of worsening inequalities within the food system, and it might be aggravated in case of disregarding both food security and food safety issues. Gómez Garrido, Carbonero Gamundí, & Viladrich (2019), in turn, have analysed the core of “grassroots food banks,” and have considered it as a counterpoint to the philanthropic feature of “conventional” food banks. According to the authors, by stimulating new forms of interpersonal collaboration, grassroots food banks may enable advances in a social and political emancipatory agenda, reinforcing claims for justice and protection of rights and against the typical assistance of donations, thus introducing solidarity in the social and political field.

From an economic perspective, Mousa & Freeland-Graves (2017), and Sert, Garrone, Melacini, & Perego (2018) say that the FR&D has been a low-cost

alternative to feed people while avoiding the production of waste, while Arcuri (2019) and Vlaholias, Thompson, Every, & Dawson (2015b) refer to a conciliatory feature as a "win-win" solution, by allowing benefits for those in need as well as for donors.

Kinach, Parizeau, & Fraser (2019) and McIntyre, Patterson, Anderson, & Mah (2017) note limitations for FR&D as a strategy to fight food insecurity and improve waste management.On the one hand, regarding the stigma of recovered food as "food that would go to the garbage," and on the other, due to its limitations to accomplish rights, it cannot fully guarantee the human right to adequate food.

Nonetheless, despite the enticing idea to solve two significant issues (food insecurity and waste management) [7], it is necessary to understand the possibilities of conciliation, considering the conflicts of interest and the incompatibility of specific goals. Although FR&D has limitations, it´s not a useless strategy, so it must be viewed as a possibility of integrating such actions to fight waste and thus playing a complementary role within a more extensive set of policy measures.

4. 3. FR&D: far beyond charity

The first food bank in the world was created in 1960 in the United States [8], and from that time to the present day, FR&D has been intensified, become complex, spread around the world, and there is no doubt about its contribution to reducing food insecurity and food waste (De Pieri, Tallarico, Baglioni, Soler, & Ricciuti, 2017).

More recently, the shifting of the role of FR&D in developed countries - primarily influenced by the "Great Recession of 2008" (Arcuri, 2019; Gómez Garrido, Carbonero Gamundí & Viladrich, 2019), highlights the increasing dependency of people in food poverty of food banks, thus becoming a permanent source of feeding for them (Bazerghi, McKay, & Dunn, 2016; De Pieri, Tallarico, Baglioni, Soler, & Ricciuti, 2017; Rovati, 2015).

The ever-increasing dependency on these food sources has long-term implications, both because it is unable to fully provide the nutritional needs of its users (Mourad, 2016; Reynolds, Piantadosi, & Boland, 2015), and for creating a "welfare system" that eventually prevents them from achieving food security Kinach, Parizeau, & Fraser, 2019; Mura, Castiglioni, Borrelli, Ferrari, & Diamantini, 2019; Vlaholias, Thompson, Every, & Dawson, 2015b).

In addition, despite FR&D alleviating food necessities of the neediest populations, it ends up distancing them from the governments' attention and responsibility for ensuring food for all (Compagnucci, Cavicchi, Spigarelli, & Natali, 2018; P. González-Torre et al., 2017).

Lorenz (2012) points out that the charitable donations of food, especially in affluent societies, has an ambivalent feature: both because in this context there is more waste than hungry people and because, by creating alternative routes to market and institutions, there is a reinforcement rather than overcoming social exclusion, since it addresses the consequences rather than the causes of poverty.

Furthermore, as food banks depend on voluntary donations, there is an aggravation to quantity and to quality of food that will be donated: in the quantitative aspect, as observed by Tarasuk & Eakin (2003) and Adams, Christopher; Tabacchi (1997), to remain competitive in the market, as long as the efficiency of donor operations increases, there is a tendency of decreasing the number of donations.

In addition, food banks must distribute all food they collect, regardless of its nutritional value, as they are restrained to donor availability (Tarasuk & Eakin, 2005), and unpredictability, either on the supply (Bazerghi, McKay, & Dunn, 2016), or on the demand side (Lee, Sönmez, Gómez, & Fan, 2017). This situation

[7] In France, Law n. 138/2016, the "Law against food waste" (*Loi relative à la lutte contre le gaspillage alimentaire*), is the first legal initiative in Europe to tackle food waste by prohibiting supermarkets (of over 400 square metres) of disposing surplus food in the waste treatment systems and obliging them to donate it to charitable organisations (Foti et al., 2018; Baglioni, De Pieri, & Tallarico, 2017)

[8] John Von Hengel, a retired businessman who worked in the 1960s as a volunteer in a soup kitchen in Phoenix, Arizona, founded the first food bank in the United States. He noticed that while the soup kitchen did not have enough food to serve to the people in need, restaurants and supermarkets in the surroundings were throwing away good food. He started to collect the wasted food from these companies and donate it to feed the needy (Schneider, 2013).

ISSN-Internet 2197-411x OLCL 862804632

makes it difficult for action plans to promote a healthy diet. Regarding food healthiness, Tarasuk & Eakin (2005) observe that the way food banks work and organise the distribution of industrialized products, albeit they seem to create an alleged "win-win" situation among the hungry and corporations, they end up delivering not-sold food from industry, undermining nutritional requirements of people in need.

Moreover, as observed by Tarasuk & Eakin (2003) and followed by P González-Torre, Lozano, & Adenso-Díaz (2017), another important consequence of the way food banks work is that they make the needs of the beneficiaries invisible. Once the hunger problem seems to be managed, the financial support for this population becomes unnecessary, and both the community and the government make fewer efforts to overcome food poverty leading to more inequality and a greater reliance on assistance from food banks.

4.4 Study limitations

It is essential to highlight that, according to the criteria defined in the methodology herein, there was no intention to restrict the research to FR&D in developed countries. However, considering the selected studies, there is a set of empirical studies limited to developed countries, so it is not clear if this has occurred randomly or if recent publications have privileged studies of FR&D in developed countries. It is also necessary to consider that the search criteria were undertaken in English, which may be a limiting factor in selecting non-English speaking countries. Thus, more focused studies will confirm whether there are, in fact, few studies addressing the situation of developing countries.

5. Conclusions

The FR&D is a strategy that has not yet achieved practical results in line with the expectations attributed to it, even though it has gained visibility in recent years, mainly due to the potential to face two major challenges of contemporary public policies (fighting food insecurity and adequate waste management)
This is partially due to the complexity involved in FR&D operations: logistical, institutional, cultural, and legal challenges, which impose limits and possibilities for its integration into the public policies field. Nevertheless, there is a shift in the historical process of charity assistance by adding to its objective's benefits to the environment.

The interests identified apparently would be a "win-win" situation, in which all stakeholders have benefits: the poor, because they get food; companies, because they dispose of the waste and get rid of the disposal costs; the environment, because the deviation of suitable food from the treatment route. Nonethless a careful evaluation points out that it might not reach the expected outcome.

Thus, aiming to critically problematise the FR&D, first, it is concluded that there is a need for further studies mainly regarding the situation of developing countries, allowing a research agenda focused on these countries. Second, the integration of FR&D into public policies addressing the waste management and food insecurity issues is helpful; however, it is not a solution neither for the environmental impacts of FL&W nor the problems of hunger and malnutrition. On the contrary, the literature points out the misappropriation of FR&D operations by a market rationale, which might reinforce the same means and reasons for the emergence of losses and food waste in the food chain.

Conflict of Interest

The authors declare no conflict of interest. Besides, the funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

Acknowledgement

We sincerely thank the reviewers for their careful review and thoughtful comments towards improving our manuscript.
This work was carried out with the support of the Coordination for the Improvement of Higher Education Personnel - Brazil (CAPES - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) - Financing Code 001.

References

De Pieri, B., Tallarico, T., Baglioni, S., Soler, U., & Ricciuti, E. (2017). European policy for food security: the surplus food redistribution option. In Foodsaving in Europe: At the crossroad of social innovation (p. 1–164). https://doi.org/10.1007/978-3-319-56555-2

Rovati, G. (2015). The paradox of scarcity in abundance: contribution of food banks against poverty in Italy. In L. E. San-Epifanio & M. de Renobales Scheifler (Eds.), Envisioning a Future Without Food Waste and Food Poverty: Societal Challenges (1st ed., pp. 260–264). Wageningen: Wageningen Academic Publishers. https://doi.org/10.3920/978-90-8686-820-9

Sert, S., Garrone, P., Melacini, M., & Perego, A. (2015). Surplus food redistribution for social purposes: analysis of critical success factors. In L. E. San-Epifanio & M. de Renobales Scheifler (Orgs.), Envisioning a Future Without Food Waste and Food Poverty: Societal Challenges (p. 1–350). https://doi.org/10.3920/978-90-8686-820-9

Vlaholias, E., Thompson, K. R., Every, D., & Dawson, D. (2015b). Reducing food waste through charity: Exploring the giving and receiving of redistributed food. In L. E. San-Epifanio & M. de Renobales Scheifler (Orgs.), Envisioning a future without food waste and food poverty: Societal challenges (p. 271–277). Wageningen Academic Publishers. https://doi.org/10392097890868682093 3

Adams, Christopher; Tabacchi, M. (1997). Perishable-food-rescue programs Status and prospects. The Cornell Hotel and Restaurant Administration Quarterly, 38(2), 62–67. https://doi.org/10.1016/s0010-8804(97)81477-2

Aiello, G., Enea, M., & Muriana, C. (2015). Alternatives to the traditional waste management: Food recovery for human non-profit organizations. International Journal of Operations and Quantitative Management, 21(3), 215–239.

Albizzati, P. F., Tonini, D., Chammard, C. B., & Astrup, T. F. (2019). Valorisation of surplus food in the French retail sector: Environmental and economic impacts. Waste Management, 90, 141–151. https://doi.org/10.1016/j.wasman.2019.04.034

Alexander, C., & Smaje, C. (2008). Surplus retail food redistribution: An analysis of a third sector model. Resources, Conservation and Recycling, 52(11), 1290–1298. https://doi.org/10.1016/j.resconrec.2008.07.009

Arcuri, S. (2019). Food poverty, food waste and the consensus frame on charitable food redistribution in Italy. Agriculture and Human Values, 36(2), 263–275. https://doi.org/10.1007/s10460-019-09918-1

Bazerghi, C., McKay, F. H., & Dunn, M. (2016). The Role of Food Banks in Addressing Food Insecurity: A Systematic Review. Journal of Community Health, 41(4), 732–740. https://doi.org/10.1007/s10900-015-0147-5

Bierma, T. J., Jin, G., & Bazan, C. N. (2019). Food donation and food safety: Challenges, current practices, and the road ahead. Journal of Environmental Health, 81(10), 16–21.

Bilska, B., Wrzosek, M., Kołozyn-Krajewska, D., & Krajewski, K. (2016). Risk of food losses and potential of food recovery for social purposes. Waste Management, 52, 269–277. https://doi.org/10.1016/j.wasman.2016.03.035

Busetti, S. (2019). A theory-based evaluation of food waste policy: Evidence from Italy. Food Policy, 88. https://doi.org/10.1016/j.foodpol.2019.101749

Compagnucci, L., Cavicchi, A., Spigarelli, F., & Natali, L. (2018). A multi-stakeholder attempt to address food waste: The case of Wellfood Action EU project. Economia Agro-Alimentare, 20(3), 503–528. https://doi.org/10.3280/ECAG2018-003012

De Boeck, E., Jacxsens, L., Goubert, H., & Uyttendaele, M. (2017). Ensuring food safety in food donations: Case study of the Belgian donation/acceptation chain. Food Research International,100(May),137–149. https://doi.org/10.1016/j.foodres.2017.08.046

FAO. (2014). Food losses and waste in the context of sustainable food systems. A report by The High Level Panel of Experts on Food Security and Nutrition. Rome: Committee on World Food Security, Food and

ISSN-Internet 2197-411x OLCL 862804632

Agriculture Organization of the United Nations. Retrieved from https://www.fao.org/3/i3901e/i3901e.pdf

Foti, V. T., Sturiale, L., & Timpanaro, G. (2018). An overview of food waste phenomenon: By problem to resource. Quality - Access to Success, 19(S1), 232–240.

Garrone, P., Melacini, M., & Perego, A. (2014). Surplus food recovery and donation in Italy: The upstream process. British Food Journal, 116(9),1460–1477. https://doi.org/10.1108/BFJ-02-2014-0076

Gómez Garrido, M., Carbonero Gamundí, M. A., & Viladrich, A. (2019). The role of grassroots food banks in building political solidarity with vulnerable people. European Societies, 21(5),753–773. https://doi.org/10.1080/14616696.2018.1518537

González-Torre, P. L., & Coque, J. (2016). From food waste to donations: The case of marketplaces in Northern Spain. Sustainability (Switzerland), 8(6). https://doi.org/10.3390/su8060575

González-Torre, P., Lozano, S., & Adenso-Díaz, B. (2017). Efficiency Analysis of the European Food Banks: Some Managerial Results. Voluntas, 28(2), 822–838. https://doi.org/10.1007/s11266-016-9814-0

Gustavsson, J., Cederberg, C., Sonesson, U., Otterdijk, R. van, & Meybeck, A. (2011). Global food losses and food waste : extent, causes and prevention : study conducted for the International Congress "Save Food!" at Interpack 2011 Düsseldorf, Germany. Rome: FAO. Retrieved from https://www.fao.org/3/i2697e/i2697e.pdf

Hecht, A., & Neff, R. A. (2019). Food rescue program evaluations: a systematic review. Sustainability, 11(23), 6718. https://doi.org/https://doi.org/10.3390/su11236718Henz, G. P., & Porpino, G. (2017). Food losses and waste: how Brazil is facing this global challenge? Horticultura Brasileira, 35(4), 472–482. https://doi.org/10.1590/s0102-053620170402

Kinach, L., Parizeau, K., & Fraser, E. D. G. (2019). Do food donation tax credits for farmers address food loss/waste and food insecurity? A case study from Ontario. Agriculture and Human Values, 37(2), 383–396. https://doi.org/10.1007/s10460-019-09995-2

Koutsoumanis, K., Allende, A., Alvarez-Ordóñez, A., Bover-Cid, S., Chemaly, M., Davies, R., … Bolton, D. (2018). Hazard analysis approaches for certain small retail establishments and food donations: second scientific opinion. EFSA Journal, 16(11). https://doi.org/10.2903/j.efsa.2018.5432

Lee, D., Sönmez, E., Gómez, M. I., & Fan, X. (2017). Combining two wrongs to make two rights: Mitigating food insecurity and food waste through gleaning operations. Food Policy, 68, 40–52. https://doi.org/10.1016/j.foodpol.2016.12.004

Lorenz, S. (2012). Socio-ecological consequences of charitable food assistance in the affluent society: The German Tafel. International Journal of Sociology and Social Policy, 32(1998), 386–400. https://doi.org/10.1108/01443331211249011

McIntyre, L., Patterson, P. B., Anderson, L. C., & Mah, C. L. (2017). A great or heinous idea?: Why food waste diversion renders policy discussants apoplectic. Critical Public Health, 27(5), 566–576. https://doi.org/10.1080/09581596.2016.1258455

Milicevic, V., Colavita, G., Castrica, M., Ratti, S., Baldi, A., & Balzaretti, C. M. (2016). Risk assessment in the recovery of food for social solidarity purposes: preliminary data. Italian Journal of Food Safety, 5(4), 234–238. https://doi.org/10.4081/ijfs.2016.6187

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., Altman, D., Antes, G., … Tugwell, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. PLoS Medicine, 6(7). https://doi.org/10.1371/journal.pmed.1000097

Mourad, M. (2016). Recycling, recovering and preventing "food waste": Competing solutions for food systems sustainability in the United States and France. Journal of Cleaner Production, 126, 461–477. https://doi.org/10.1016/j.jclepro.2016.03.084

Mousa, T. Y., & Freeland-Graves, J. H. (2017). Organizations of food redistribution and rescue. Public Health, 152, 117–122. https://doi.org/10.1016/j.puhe.2017.07.031

Mura, G., Castiglioni, I., Borrelli, N., Ferrari, M., &

Diamantini, D. (2019). Recycling food to promote social inclusion. An empirical evidence. Revista de Cercetare si Interventie Sociala, 65, 325–337. https://doi.org/10.33788/rcis.65.20

Phillips, C., Hoenigman, R., Higbee, B., & Reed, T. (2013). Understanding the Sustainability of Retail Food Recovery. PLoS ONE, 8(10). https://doi.org/10.1371/journal.pone.0075530

Porpino, G., Parente, J., & Wansink, B. (2015). Food waste paradox: Antecedents of food disposal in low income households. International Journal of Consumer Studies, 39(6), 619–629. https://doi.org/10.1111/ijcs.12207

Reynolds, C. J., Piantadosi, J., & Boland, J. (2015). Rescuing food from the organics waste stream to feed the food insecure: An economic and environmental assessment of australian food rescue operations using environmentally extended waste input-output analysis. Sustainability (Switzerland), 7(4), 4707–4726. https://doi.org/10.3390/su7044707

Sakaguchi, L., Pak, N., & Potts, M. D. (2018). Tackling the issue of food waste in restaurants: Options for measurement method, reduction and behavioral change. Journal of Cleaner Production, 180, 430–436. https://doi.org/10.1016/j.jclepro.2017.12.136

Schneider, F. (2013). The evolution of food donation with respect to waste prevention. Waste Management, 33(3), 755–763. https://doi.org/10.1016/j.wasman.2012.10.025

Sert, S., Garrone, P., Melacini, M., & Perego, A. (2018). Corporate food donations: altruism, strategy or cost saving? British Food Journal, 120(7), 1628–1642. https://doi.org/10.1108/BFJ-08-2017-0435

Tarasuk, V., & Eakin, J. M. (2003). Charitable food assistance as symbolic gesture: An ethnographic study of food banks in Ontario. Social Science and Medicine, 56(7), 1505–1515. https://doi.org/10.1016/S0277-9536(02)00152-1

Tarasuk, V., & Eakin, J. M. (2005). Food assistance through "surplus" food: Insights from an ethnographic study of food bank work. Agriculture and Human Values, 22(2), 177–186. https://doi.org/10.1007/s10460-004-8277-x

Thyberg, K. L., & Tonjes, D. J. (2016). Drivers of food waste and their implications for sustainable policy development. Resources, Conservation and Recycling, 106, 110–123. https://doi.org/10.1016/j.resconrec.2015.11.016

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. British Journal of Management, 14(3), 207–222. https://doi.org/10.1111/1467-8551.00375

Vlaholias, E., Thompson, K., Every, D., & Dawson, D. (2015a). Charity starts ... at work? Conceptual foundations for research with businesses that donate to food redistribution organisations. Sustainability (Switzerland), 7(6), 7997–8021. https://doi.org/10.3390/su7067997

Warshawsky, D. N. (2016). Food waste, sustainability, and the corporate sector: case study of a US food company. Geographical Journal, 182(4), 384–394. https://doi.org/10.1111/geoj.12156

ISSN-Internet 2197-411x OLCL 862804632

UniKassel & VDW, Germany- December 2021