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RETAIL ROLE IN THE FOOD WASTE CHAIN: A LITERATURE REVIEW AND RESEARCH AGENDA

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1. INTRODUCTION

It is assumed that one-third of all food produced for human consumption is wasted in the food value chain. When this number is dismembered along the supply chain it is assumed that more than 40% occur between retail and consumer household, especially in developed countries (Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, 2011; FAO, 2012). To retail is associated the smallest participation, 5% identified in a European study (Cicatiello, Franco, Pancino, & Blasi, 2016).

In the literature is recognized that there is a gap regarding the retail role in the food waste chain (Cicatiello et al., 2016; Teller, Holweg, Reiner, & Kotzab, 2018). One of the possible explanations could be the small percentage of the waste produced at the retail level compared to the other links in the food chain. However, even that small percentage represents an expressive volume that is physically concentrated what could enable the implementation of food waste mitigative initiatives; Second, it is known the influential power that the retail has in the food value chain, from buying power to influence on consumer behavior (Dreyer, Dukovska-Popovska, Yu, & Hedenstierna, 2019; Tjärnemo & Södahl, 2015). Based on the exposed, it is mandatory in the context of the food value chain and waste reduction initiatives, to understand the retail role in the food waste chain, its influential power and how this power can be utilized toward a more sustainable chain.

This gap is addressed by the following work that through a systematic literature review organize and summarize more than 80 articles that were identified as relevant in the literature related to retail and food waste available in the most influential journals of management, operation, and retail area. The bibliometric and content analysis allowed the identification of four big themes/groups of articles: food waste understanding, food waste identified causes, retail tools to reduce food waste, and alternative solutions for food waste reduction or food waste reduction impact. Those groups of articles were analyzed, summarized and a research agenda was built to direct future research and reduce the identified gap. The article is organized as follows: introduction, methodology, results – bibliometric and content analysis, discussion and research agenda.

2. METHODOLOGY

A systematic literature review was developed to understand how the academic field is addressing food waste at the retail level and capture of gaps and topics to be further explored (Webster & Watson, 2002). The database adopted as source of this study was the Business

source complete from Ebsco because it comprises all the top journals of business administration, retail and operation management on its base, considering the classification of the ABS list 2018. The search was limited by peer-reviewed articles published in English. Articles were identified using the search terms: "food waste" AND "retail", "food waste" AND "store", "food waste" AND "market" to get the relevant references that discuss food waste at the point of sales - retail, street markets, and supermarkets.

The search results in 82 articles that were narrow to 48 after checking for duplicity. All the articles were classified and have the content of abstract and introduction fully analyzed in order to have the identification of the following data: title, authors, year of publication, publication name, main topic (s) or theme, unit of analysis and/or analyzed link of the supply chain, methodology, geographical origin of the fieldwork, main findings, etc. When the abstract and introduction do not allow the retrieve of the information, the article was fully read what occurs with more than 30 articles. The classification and initial analysis end on an excel spreadsheet with more than 900 fields. After that initial moment, new articles analysis was made to build the summaries and research agenda.

Limitations:

The choice of specific words and database limits the search results, what is a way to make a clear delimitation of the subject and context to be analyzed, and it is the objective of the specific work. However, it is important to mention that food waste has been developed in other academic areas as food literature and sustainability, other relevant articles were identified. However, the following work only considers the 48 articles found as described below and is part of the management and operation literature.

3. RESULTS

3.1 Bibliometric data analysis

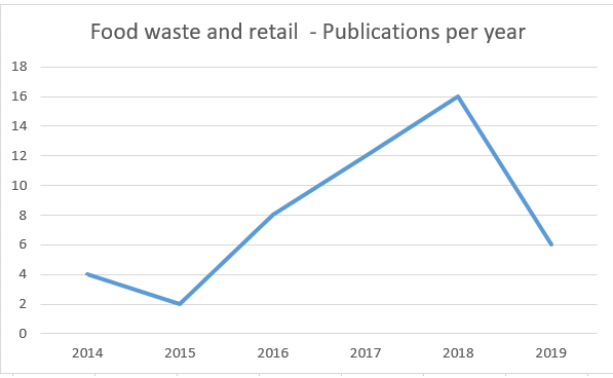

Figure 1 Number of publications per year (source: author)

The analysis of the bibliometric data indicates that "food waste and retail' as a combined subject is only recently addressed on the selected set of publications. The first articles were published in 2013 and since then it is observed a continuous increase of the topic relevance (Figure 1).

The theme is explored in a wide variety of publications, our sample observes more than 26 journals address the topic at least once. However, only the Journal of Cleaner production do it in a more systematic and relevant

way with 17 publications, which represents 35% of the analyzed publications. The second journal in the number of publications is the International Journal of Production and Economics with 3 articles, followed by Computer & Industrial Engineering, Journal of International Food & Agribusiness Marketing, Journal of Public Policy and Marketing, and Journal of Retailing and Consumer Service with two articles each. The same kind of dynamic is observed regarding authors, only Aschemann- Witzel, de Hooge and Gollnhofer are authors cited more than one time. Interesting to mention that none of the best-ranked journals at ABS are found in our list (see appendix 1).

The units o analysis was mostly stores that analyze food waste level and tools for improvement of store performance. A lot of case studies were found, and as a methodology, qualitative studies are prevalent but quantitative (quantification and experiments) and theoretical articles were also founded.

3.2 Content analysis.

From the analysis of abstracts, introductions and full text when needed four groups of articles or main topics emerge: the biggest one, and under which almost all the articles are included is "Food waste understanding" this group, based on the selected articles, do an overview of what is known about food waste related to the retail, retail role on the food chain, mostly its interaction with other actors such producers and consumers; a second group is "Quantification", some numbers that help the understanding of the size of food waste and the impact – social, economic and environmental, of food waste, it is an alternative perspective to help in the understanding of food waste as a phenomena that need to be addressed; the third group is "Retail tools", articles that present the development of tools that help retail performance, as it will be observed, most of the tools attend the perishables and cold area; The fourth group is comprised of "Alternative solutions", solutions related to food security mitigation and or environmental reduction impact of the food supply chain. Following the compilation of main findings organized by the groups, most articles are included in more than one group.

3.2.1. Food waste understanding

3.2.1.1. General information – What is food waste and why does it matter.

Food waste has the unanimous understanding that it is a very complex issue that cannot be addressed by isolated and simple initiatives (Aschemann-Witzel, Jessica; de Hooge, Ilona E.; Rohm, Harald; Normann, Bossle, & Grønhøj, Alice; Oostindjer, 2017).

Food waste is defined by FAO as "…food that completes the food supply chain up to a final product, of good quality and fit for consumption, but still does not get consumed because it is discarded, whether or not after it is left to spoil. Food waste typically (but not exclusively) takes place at retail and consumption stages in the food supply chain", "Food that was originally meant for human consumption but leaves the human food chain is considered as food loss, even if it is then directed to a nonfood use (animal feed, bioenergy)"(Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, 2011); For an overview of food waste definitions see: Gruber, Holweg, & Teller, 2015.

Food waste is relevant to be avoided because it has at least three significant impacts: economic, social and environmental. Economic impact due to the cost/ waste of resources that occur when a food is discarded, the waste of the cumulative investment of resources (energy, soil, water, carbon fossil, etc.); Social, because of food insecurity, food insecurity is determined by the lack of access (purchase power, food price) to food that occur with an important part of the world population, important to realize that for most cases, hungry is a problem of access rather than a supply problem (Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, 2011); and environmental impact due to gas emission consequent of the discard that occurs mainly in landfill or incineration process; beyond all the natural resources that were invested to a discarded production, is a double lose (Cicatiello et al., 2016).

3.2.1.2. Food waste main causes

Food waste along the food chain mainly occurs at the end of the chain for developed countries (retail/ consumers) and in the beginning of the food chain (production, transportation) for underdeveloped countries, mainly due to the lack of efficient process in the beginning of the food chain (Cicatiello et al., 2016; Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, 2011). At the end of the chain, retail represents the smallest part of food waste, representing 5% versus more than 40% of the representation of the food waste across the value chain (Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, 2011). Food waste occurrence is associate to a diverse and numerous causes influenced by the socio-economical context, production choices, and patterns, structure of distribution channels, retail and consumer practices (Cicatiello et al., 2016).

At the retail, causes of food waste are mainly associated to the lack of efficiency across the operation of the chain such transportation conditions, stock size management, handling of food by store personnel and consumers, promotional marketing strategies, shelf life-size and fragility of products associated to bad inventory management, legal obligations and food labeling regulation policies (Jessica Aschemann-Witzel, de Hooge, Amani, Bech-Larsen, & Oostindjer, 2015; Gruber et al., 2015); those causes associated to poor consumer awareness about food waste, inflexible corporation policies at retail and industry, and limited control over suppliers and food waste initiatives (Filimonau & Gherbin, 2018) creates considerable amount of unsaleable food that are still edible for consumer consumption.

Teller et al, 2018 made a rank of food waste causes at retail based on the perspective of store managers, and gives a glimpse of the main concerns of managers at the point of sales such as Difficulties on the forecast of sales is considered the main cause of FW at the point of sales, it causes over purchase and or over production, what can be worsened with company and consumer requirement of 100% availability of products and marketing promotional calendar; high-quality standards required by organizations and consumers leads to the rejection and or discard of considerable amount of edible food; undesirable customer behavior in handling products, mainly fruits and vegetables, damage products at the point of sales and to an unsaleable classification; products delivered too close to expiration date or with poor quality is also an issue more linked to supplier contracts and relationship that affects food waste and unsaleable products at the point of sales; excess or big fluctuation of products availability in the point of sales, mostly due to promotional moments is associate to the discard of edible food;

too large size of secondary packaging that obliges the purchase of big amount of products is also a cited issue.

Food waste occurs at the consumer level based on a variety of causes and or motivations. To consumer is associated an extensive list of conflicting motivations regarding food and food waste such as: taste, food safety, food security, status concern, time pressure; convenience, indulgence, taste, economical behavior, values, habits, etc. and on top of it a big-time delay between food choice and purchase what can explain the repeated unwanted, undesired behavior of food waste (Setti, Banchelli, Falasconi, Segrè, & Vittuari, 2018).

Retail is considered the main influencer of consumer purchase habits, which involves quantity, quality of food, frequency of shopping, etc. (Setti et al., 2018; Tjärnemo & Södahl, 2015). The influence of retail was originally only associated with the influence of marketing and promotional campaigns that are proved to be efficient ways to promote purchase at a retail store and change of behavior (Pearson, D.; Perera, 2018; Young, Russell, Robinson, & Chintakayala, 2018). However, the retail influences go beyond marketing initiatives, retail is considered to shapes grocery shopping patterns like shopping frequency, purchase size, travel time to purchase, etc. what impact the purchase profile and in consequence the food waste at the household level (K. C. L. Lee, 2018). The power of retail goes beyond marketing initiatives and is a key aspect to be explored to understand consumer food waste at the household level, the higher volume of waste identified in the food value chain.

3.2.1.3 Food waste mitigation initiatives

According to the analyzed literature, there is a complex and large group of causes for food waste, as there are a large number of initiatives that address its mitigation and or elimination. Those initiatives are classified into three groups: Information capacity building, redistribution initiatives, and alteration in the food chain.

Information capacity building initiatives impact the food value chain. Information is considered the main tool to increase awareness regarding food waste mitigation practices, and food waste impact on environment, society, and economy. Previously it was already proved that the use of traditional communication channels and the repetition of specific message can change consumer practices and impact significantly the food waste level at the household (Marx-Pienaar & Erasmus, 2014; Young et al., 2018); Information capacity building provides information that creates awareness, address best practices on handling, storing, managing food, give tips to reduce, reuse or eliminate food waste and has a large impact from consumer to food providers with the main objective to reduce food waste and change behavior along the food chain (Pearson, D.; Perera, 2018). Labeling and packaging information are also categorized as information capacity building and impact food handling, storage and consequently food waste (Jessica; Aschemann-Witzel, de Hooge, & Normann, 2016; Gruber et al., 2015).

Redistribution initiatives are initiatives that give other directions to food in the value chain, such as donations or selling of products, ingredients or prepared food. Redistribution initiatives are mainly directed by retail according to the review and are not necessarily a corporate indication, having store manager a key role in the search and management of distribution

initiatives and cooperation with other actors such as ONG and charity institutions (Jessica Aschemann-Witzel et al., 2015; Filimonau & Gherbin, 2018).

Retail supply chain alteration initiatives are changes in the dynamic of the food chain, what can include changing policies (governmental and corporative), cooperation or synchronization between actors of the chain, etc. (Aschemann-Witzel, Jessica; de Hooge, Ilona E.; Rohm, Harald; Normann et al., 2017). Examples include the change in laws and regulations such as more flexibility in labeling that can allow the increase of donation and consumption, the food donation regulation, smaller packaging offering, etc. (Gruber et al., 2015).

3.2.1.4 Retail role and power

Food waste at retail is not the biggest fraction of food discarded at supply chain, it is estimated that around 5% of food waste occurs at the retail level (Cicatiello et al., 2016; Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, 2011); probably this is the main reasons why food waste at the retail level has not been studied in-depth as it would be expected (Cicatiello et al., 2016; Teller et al., 2018). However, the retail along with wholesale and distributors has the power to decide what food quantity and quality will be offered. Retail has the buying power of the food chain, the strongest link of the chain (Gruber et al., 2015; Setti et al., 2018; Tjärnemo & Södahl, 2015) (Devin, Bree; Richards, 2018; Reicks, 2016). This power directs the flow of the food value chain because it defines what will be produced – quantity and quality, offered and promoted to consumers. Retail has the power to influence not just that mix but also the dynamic of the chain, behavior profile that directly impacts food waste at all actor's level and is particularly key to consumers (Gruber et al., 2015).

Naidoo & Gasparatos, 2018 explores what drives environmental sustainability adoption by the retail sector. As can be expected, the initial driver is economic through cost-saving with the reduction of resources use such as energy and packaging that results in the reduction of gas emission of the operation. Recycling and food waste mitigation initiatives were also detected to be prioritized as an answer to society regarding social responsibility. The sustainable behavior can cause tensions and conflicts between actors in the value chain (Gollnhofer, J. F.; Schouten, 2017). The waste is transferred for the weakest links, producers, and consumers (Devin, Bree; Richards, 2018). Some retailers are assumed to have already incorporated the role to promote and encourage a more sustainable chain with action such energy savings, transportation efficiency, recycling initiatives, encouragement of local and seasonal purchase however what would be the next step? According to Tjarnemo et al 2015, the next step is to encourage the reduction of consumption, particularly the reduction of consumption of more negative footprint food like beef (Tjärnemo & Södahl, 2015).

3.2.2 Quantification – Some numbers on food waste, retail food waste and environmental impact.

It is estimated that approximately one-third of all food produced for human consumption is wasted in the food value chain. On the analyzed articles some numbers, mostly associated to specific cases, are explicit and are reproduced because it gives a perspective of the "size" of the food waste phenomena and why it can be important to reduce its occurrence.

Cicatiello et al., 2016, mention that according to the European commission the food value chain in the EU is responsible for 17% of Europe's direct greenhouse gas emissions and 28% of its material resource use. Considering food waste along the food value chain, manufacturing would be responsible for 39%, food service and catering for 14%, retail only 5%, and household food waste represents the biggest participation in waste with 42%. Considering the food that was recovered at retail, the biggest group of food that is unsaleable but still edible for human consumption in the presented example (Italy) is bread, responsible for 17 tons, followed by the 2 tons of the second-biggest volume of food waste meat. However, when considered the impact on water footprint and ecological footprint, meat has a bigger impact, that is more than ten times superior to the bread impact considering environmental footprint per volume - 30k x 27k of water footprint, and 308k x 86k of environmental footprint are associated to the related volumes.

The difference in environmental impact was also quantified in Norway, where three types of dinner meal – a traditional meal prepared with fresh food, semi-prepared ingredients, and ready to eat meal. Ready to eat meal was identified as the higher energy consumption and GHG emission, the emission of this dinner meal was equivalent to 900Km of standard car usage; the semi-prepared ingredients presented the lowest environmental impact.

In Finland, a study identified 23Kg per capita/ year of food waste at the household, which represents 63 Kg year per household. Based on the estimated volume of purchase of 500Kg to 600kg of food per household, the waste represents 4% to 5% of the purchased food. The waste was composed of vegetables (19%) leftover (18%), milk products (17%), fruits and berries (13%), bakery and grain products (13%), meat and eggs (7%), etc. It represented almost 70 euros/ year per person and the combination of all food waste at household emission is equivalent to 100.000 car emissions. At foodservice, the percentage of waste between produced and waste was between 7 to 28% depending on the profile of the establishment. Daycare, hospitals, and workplaces with canteen represent the biggest percentage of food waste compared to the purchased food; however, the biggest amount was found in schools, cafes, and restaurants. At retail, it was identified as a percentage of waste between 1% and 2%. The main percentage of waste were identified as fruits, vegetables and bread (Katajajuuri, Silvennoinen, Hartikainen, Heikkilä, & Reinikainen, 2014).

As can be observed several numbers of food waste at the household and retail level in absolute and percentage do not converge. There is a discrepancy of food waste at the retail level from 1 to 5 % in the minimum, and significant kilograms of waste at the household level. However, all the results associate very low volume to retail and the highest level to households and consumers.

3.2.3 Retail tools

From the selected articles, eight articles are related to the creation or implementation of tools directed to improve operational performance, mostly at the retail level, except for one that analyzes opportunities to energy saving in the US food industry (Xu & Szmerekovsky, 2017). The most utilized opportunity was the improvement of operational management in the perishable area. Tool was developed to improve sales, quantify the potential improvement of operational margin with the decrease of food waste and more fresh product availability

(Broekmeulen & van Donselaar, 2019); Other were developed to make a better forecasts of perishables for online (Fikar, 2018) and offline stores (Arunraj, N. S.; Ahrens, 2015; Janssen, L.; Sauer, J.; Claus, T.; Nehls, 2018); Another article analyzed the superior performance of automatic replenishment for grocery store what results beyond superior operational margin and food waste reduction, it increases the availability and shelf life of the products (Kiil, K.; Dreyer, H. C.; Hvolby, H.H.; Chabada, 2018); another developed a systematic approach to prevent chilled food waste; and finally another developed a tool to prioritize the food to be wasted based on monetary and environmental impact that can be customized according to retail corporate or operational objectives (Dreyer et al., 2019). Only one of the analyzed tools focused on the recovery of food that would be wasted at the retail, this tool is dedicated to reverse logistic and can be classified as one successful initiative to reduce food waste by redistribution (Bottani, E.; Mannino, F.; Vignali, G.; Montanari, 2018).

As it can be observed, the opportunity detected to develop tools were focused on the increase of operational performance mainly in the perishable area what is a reality in the grocery retail management due to the emergence of time pressure that perishables products impose.

3.2.4 Alternative solutions

Part of the analyzed articles was dedicated to the proposal of alternative solutions. Those solutions were classified as "alternatives" because they are not part of the current market initiatives and are just listed to contextualize the research regarding food waste and environmental impact.

Two studies address the consumption of unattractive products, products that normally are not accepted by the biggest retail chain or are commercialized with an expressive price reduction. The two initiatives obtain success in the acceptance of those products, one initiative use anthropomorphism to reverse perception (Cooremans, K.; Geuens, 2019), and the other make intervention in the POS that alter the self-perception what resulted in the acceptance of those "unattractive' products (Grewal, Hmurovic, Lamberton, & Reczek, 2018).

Another study, targeting the reduction of packaging cost and environmental impact, analyzed a store without any kind of packaging. The study presented positive results such as a bigger inclusion of small farmers, and transparency of the supply chain to consumers; however, it significantly reduced the consumer convenience related to variety, timing and even lack of product protection resulting in food waste. The results of the study need to be better explored.

Two other studies explored the transformation of food waste in other products from food donations to food waste becoming the raw material for a second value chain. Both studies confirm that to make that transformation the new value creation needs to be high because transformation implies the cost of research and development of new solutions (D. Lee & Tongarlak, 2017; Mirabella, Castellani, & Sala, 2014).

Another article explores the purchase and acceptance perception of edible insect consumption as an alternative source of protein that has a significantly smaller environmental impact compared to other meat products (Baker, Melissa A.; Shin, Jungyoung Tiffany; Kim, 2016).

4. DISCUSSION AND RESEARCH AGENDA

The bibliometric data shows that food waste is a new concern for the retail reality. Articles from the present selection started in 2014, less than five years ago, and mainly presented in journals that have environmental concerns. Maybe the most striking finding of this paper is the absence of articles in the most influential journals of operation, retail or even management that address food waste at retail. The information that was firstly found in the bibliometric analysis was confirmed in the content analysis. Several articles mention the absence of relevant literature addressing food waste at the retail level (Cicatiello et al., 2016; Teller et al., 2018). A possible explanation can be the identified fact that retail is responsible for only 5% of the total food waste in the value food chain, at least in the European reality (Cicatiello et al., 2016; Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, 2011); and maybe the area, similar to some retail manager (Gruber et al., 2015), considers food waste as an intrinsic cost of the business. However, it was also mentioned that the retail, conjointly with distributors and wholesalers, is the strongest link in the food value chain; responsible for the decisions related to what will be produced, commercialized and promotions associated with the mix. At the limit, retail is responsible to define what, at what quality and quantity will be produced. Retails have the buying power. A power that should not be neglected by the food chain because it directly impacts the food waste in the value food chain. It can impact from defining quality policies at the producers, until the mix of the purchase at the consumer level. Research is needed exploring the effective power of the retail in the food value chain. Another point to be explored is the size of food waste at the retail level; how similar or different is the operation and food waste size in different realities considering developed and underdeveloped countries, store size, technology utilization, etc.

A second point to be explored is that food waste impact is mostly discussed under an environmental perspective. Even having food waste explicitly three types of impact – environmental, social and economic, the most addressed is the environment impact, probably because it is also a subject that concerns European authors and realities, with very few authors and fieldwork outside that region. It is essential to have a more holistic discussion of food waste impact that considers not just the environmental aspect but also the social and economic impact that can be particularly relevant in the reality of non-developed countries where food loss and waste coexist with food insecurity; it is crucial to have that discussion in other realities like undeveloped countries, Brics, etc. Therefore, it would be interesting to have the development of research that included the social and economic impact of food waste, and a variety of geographical/ economic realities.

A third discussion that emerges from the literature that needs to be addressed is food waste at the consumer level and the effective role that the retail plays on them. Several authors pointed to the retail power and influence on the quantity, quality, frequency, and place of shopping (Cicatiello et al., 2016; Devin, Bree; Richards, 2018; Teller et al., 2018). However, very few studies explore the consumer retail relationship and the influence of that power in the final volume and quality of food waste. It is missing the analysis of the impact from the most basic variables that compose the marketing mix such as price strategy, product placement, promotional calendar, store location, but also the impact of new technologies such the use retail apps (as fidelity program, promotional channel and online store), delivery apps, and the impact

of sustainable corporate initiatives on sustainability and social inclusion for example. Considering the role that (new) technologies can play, it would be interesting to investigate the role that redistribution platforms have on different markets, particularly in countries (underdeveloped) where the food waste is more a social than an environmental issue, and there is a lack of the donation culture for example. Can the sharing economy ally to technology tackle food waste mitigation? Can it be expressive in a country like Brazil that does not have a culture of donation?

Another point that emerges is the discussion about the quantification of food waste in the food value chain. Quantification is a need-based the photography of the potential size of the impact that food waste has on the environment, the social and economic aspect of the market reality. Previous research has already pointed the relevance of the household food waste in the total (Cicatiello et al., 2016), however, no initiatives explored the qualification of food waste at the household, the categorization of waste that would allow the real understanding of the environmental, social and economic impact and can also direct mitigative initiatives in a more effective way.

A final point to be observed is the triple bottom line at retail. Is it a reality that has been addressed? Naidoo et al, 2018 started the discussion but what are the main motivators and practices? Are there differences between implementation practices and motivations between developed and underdeveloped countries? Is the implementation more a marketing campaign with action addressing the social pressure for more sustainable business or can we accept that it exists a real direction toward an objective to reduce gas emission and by consequence reduction of food waste in the food value chain in its totality? How does the retail deal with conflict of interest, for example, consumer x over consumption at the retail store and sustainable initiatives? Those are the most important points observed in the analysis.

5. CONCLUSION

This paper, through a bibliographical review, has as main objective to understand the role of retail at the food waste chain. Based on the systematic literature review it was clear that the retail has a strong influent role in the food chain and by consequence in the food waste chain. It was also clear that food waste, up to know, was not a priority of the retail and the main reason behind it is not clear. What has become clear is the need to have a better understanding of that role and power, particularly the influence at the household level based on the volume of waste associated with this actor. Another point that was raised is the need to address the food waste discussion in a more holistic view of its impact, beyond the environmental aspect, particularly considering the reality of underdeveloped countries where the social and economic aspects can play a more relevant aspect in the discussion. Others raised aspects included the need to have a quantification of food waste that consider the categorization of the waste in order to have a more clear idea of impacts and capacity to direct mitigation initiatives, as it was raised the lack of understanding that technology can play on food waste mitigation, particularly apps that encourage purchase (example: retail apps) or food

redistribution; The last raised point is the triple bottom line that is considered one of the most relevant performance indicator of business. Is it adopted at the retail and if adopted what is the interpretation of it in the business? What is the limit of the engagement that exists? From energy-saving to the discouragement of meat consumption it has a long and complex reality to be analyzed and covered.

This work is a provocation for the development of future research. Retail has a strong and influent role in the food value chain, particularly at producers and consumer level. However, the lack of knowledge regarding specific role and power at each part of the food value chain is a gap that needs to be fulfilled to make possible the design of efficient initiatives that aim to reduce food waste along with the food system.

6. REFERENCES

Arunraj, N. S.; Ahrens, D. (2015). A hybrid seasonal autoregressive integrated moving average and quantile regression for daily food sales forecasting. *International Journal of Production Economics*, *170*(Part A), 321–335.

Aschemann-Witzel, Jessica; de Hooge, Ilona E.; Rohm, Harald; Normann, A., Bossle, M. B., & Grønhøj, Alice; Oostindjer, M. (2017). Key characteristics and success factors of supply chain initiatives tackling consumer-related food waste – A multiple case study. *Journal of Cleaner Production*, *155*, 33–45. https://doi.org/10.1016/j.jclepro.2016.11.173

Aschemann-Witzel, J., de Hooge, I., Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015). Consumer-related food waste: Causes and potential for action. *Sustainability (Switzerland)*, *7*(6), 6457–6477. https://doi.org/10.3390/su7066457

Aschemann-Witzel, J., de Hooge, I., & Normann, A. (2016). Consumer-Related Food Waste: Role of Food Marketing and Retailers and Potential for Action. *Journal of International Food & Agribusiness Marketing*, *28*(3), 271–285.

Baker, Melissa A.; Shin, Jungyoung Tiffany; Kim, Y. W. (2016). An Exploration and Investigation of Edible Insect Consumption: The Impacts of Image and Description on Risk Perceptions and Purchase Intent. *Psychology & Marketing*, *33*(2), 94–112. https://doi.org/10.1002/mar.20847

Bottani, E.; Mannino, F.; Vignali, G.; Montanari, R. (2018). A routing and location model for food waste recovery in the retail and distribution phase. *International Journal of Logistics: Research & Applications*, *21*(6), 557–578.

Broekmeulen, R. A. C. M., & van Donselaar, K. H. (2019). Quantifying the potential to improve on food waste, freshness and sales for perishables in supermarkets. *International Journal of Production Economics*, *209*(July 2017), 265–273. https://doi.org/10.1016/j.ijpe.2017.10.003

Cicatiello, C., Franco, S., Pancino, B., & Blasi, E. (2016). The value of food waste: An exploratory study on retailing. *Journal of Retailing and Consumer Services*, *30*, 96–104. https://doi.org/10.1016/j.jretconser.2016.01.004

Cooremans, K.; Geuens, M. (2019). Same but Different: Using Anthropomorphism in the Battle Against Food Waste. *Journal of Public Policy & Marketing*, *38*(2), 232–245.

Devin, Bree; Richards, C. (2018). Food Waste, Power, and Corporate Social Responsibility in the Australian Food Supply Chain. *Journal of Business Ethics*, *150*(1), 199–210. https://doi.org/10.1007/s10551-016-3181-z

Dreyer, H. C., Dukovska-Popovska, I., Yu, Q., & Hedenstierna, C. P. (2019). A ranking method for prioritising retail store food waste based on monetary and environmental impacts. *Journal of Cleaner Production*, *210*, 505–517. https://doi.org/10.1016/j.jclepro.2018.11.012

Fikar, C. (2018). A decision support system to investigate food losses in e-grocery deliveries. *Computers & Industrial Engineering*, *117*, 282–290.

Filimonau, V., & Gherbin, A. (2018). An exploratory study of food waste management practices in the UK grocery retail sector. *Journal of Cleaner Production*, *167*, 1184–1194. https://doi.org/10.1016/j.jclepro.2017.07.229

Gollnhofer, J. F.; Schouten, J. W. (2017). Complementing the Dominant Social Paradigm with Sustainability. *Journal of Macromarketing*, *37*(2), 143–152.

Grewal, L., Hmurovic, J., Lamberton, C., & Reczek, R. W. (2018). The Self-Perception Connection: Why Consumers Devalue Unattractive Produce. *Journal of Marketing*, *83*(1), 89–107. https://doi.org/10.1177/0022242918816319

Gruber, V., Holweg, C., & Teller, C. (2015). What a Waste! Exploring the Human Reality of Food Waste from the Store Manager's Perspective. *Journal of Public Policy & Marketing*, *35*(1), 3–25. https://doi.org/10.1509/jppm.14.095

Gustavsson, Jenny; Cederberg, Christel; Sonesson, Ulf; Otterdijk, Robert van; Meybeck, A. (2011). *Global food losses and food waste - Extent, causes and prevention. Food and Agriculture Organization of the United Nations (FAO)*. https://doi.org/10.1098/rstb.2010.0126

Janssen, L.; Sauer, J.; Claus, T.; Nehls, U. (2018). Development and simulation analysis of a new perishable inventory model with a closing days constraint under non-stationary stochastic demand. *Computers & Industrial Engineering*, *118*, 9–22.

Katajajuuri, J. M., Silvennoinen, K., Hartikainen, H., Heikkilä, L., & Reinikainen, A. (2014). Food waste in the Finnish food chain. *Journal of Cleaner Production*, *73*, 322–329. https://doi.org/10.1016/j.jclepro.2013.12.057

Kiil, K.; Dreyer, H. C.; Hvolby, H.H.; Chabada, L. (2018). Sustainable food supply chains: the impact of automatic replenishment in grocery stores. *Production Planning & Control*, *29*(2), 106–116.

Lee, D., & Tongarlak, M. H. (2017). Converting retail food waste into by-product. *European Journal of Operational Research*, *257*(3), 944–956. https://doi.org/10.1016/j.ejor.2016.08.022

Lee, K. C. L. (2018). Grocery shopping, food waste, and the retail landscape of cities: The case of Seoul. *Journal of Cleaner Production*, *172*, 325–334. https://doi.org/10.1016/j.jclepro.2017.10.085

Marx-Pienaar, N. J. M. M., & Erasmus, A. C. (2014). Status consciousness and knowledge as

potential impediments of households' sustainable consumption practices of fresh produce amidst times of climate change. *International Journal of Consumer Studies*, *38*(4), 419–426. https://doi.org/10.1111/ijcs.12111

Mirabella, N., Castellani, V., & Sala, S. (2014). Current options for the valorization of food manufacturing waste: A review. *Journal of Cleaner Production*, *65*, 28–41. https://doi.org/10.1016/j.jclepro.2013.10.051

Naidoo, M., & Gasparatos, A. (2018). Corporate environmental sustainability in the retail sector: Drivers, strategies and performance measurement. *Journal of Cleaner Production*, *203*, 125–142. https://doi.org/10.1016/j.jclepro.2018.08.253

Pearson, D.; Perera, A. (2018). Reducing Food Waste. *Social Marketing Quarterly*, *24*(1), 45–57.

Reicks, O. (2016). Waste Not, Hunger Not: The Logistical Solution. Bringing Smallholder Farmers to the Market using Third-Party Logistics Providers. *Journal of Food Distribution Research*, *47*(1).

Setti, M., Banchelli, F., Falasconi, L., Segrè, A., & Vittuari, M. (2018). Consumers' food cycle and household waste. When behaviors matter. *Journal of Cleaner Production*, *185*, 694–706. https://doi.org/10.1016/j.jclepro.2018.03.024

Teller, C., Holweg, C., Reiner, G., & Kotzab, H. (2018). Retail store operations and food waste. *Journal of Cleaner Production*, *185*, 981–997. https://doi.org/10.1016/j.jclepro.2018.02.280

Tjärnemo, H., & Södahl, L. (2015). Swedish food retailers promoting climate smarter food choices-Trapped between visions and reality? *Journal of Retailing and Consumer Services*, *24*(C), 130–139. https://doi.org/10.1016/j.jretconser.2014.12.007

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, *26*(2), 13–23. https://doi.org/10.2307/4132319

Xu, Y., & Szmerekovsky, J. (2017). System dynamic modeling of energy savings in the US food industry. *Journal of Cleaner Production*, *165*, 13–26. https://doi.org/10.1016/j.jclepro.2017.07.093

Young, C. W., Russell, S. V., Robinson, C. A., & Chintakayala, P. K. (2018). Sustainable Retailing – Influencing Consumer Behaviour on Food Waste. *Business Strategy and the Environment*, *27*(1), 1–15. https://doi.org/10.1002/bse.1966

APPENDIX 1

FOOD WASTE + RETAIL or MARKET or STORE				
	Author	**Year**	**Article name**	**Journal**
1	Aamir, M., Ahmad, H., Javaid, Q., & Hasan, S. M.	2018	Waste Not, Want Not: A Case Study on Food Waste in Restaurants of Lahore, Pakistan.	Journal of Food Products Marketing
2	Arunraj, N. S., & Ahrens, D.	2015	A hybrid seasonal autoregressive integrated moving average and quantile regression for daily food sales forecasting.	International Journal of Production Economics
3	Aschemann-Witzel, J., de Hooge, I. E., Rohm, H., Normann, A., Bossle, M. B., Grønhøj, A., & Oostindjer, M.	2017	Key characteristics and success factors of supply chain initiatives tackling consumer-related food waste – A multiple case study.	Journal of Cleaner Production
4	Aschemann-Witzel, J., de Hooge, I., & Normann, A.	2016	Consumer-Related Food Waste: Role of Food Marketing and Retailers and Potential for Action	Journal of International Food & Agribusiness Marketing
5	Baker, M. A., Shin, J. T., & Kim, Y. W.	2016	An Exploration and Investigation of Edible Insect Consumption: The Impacts of Image and Description on Risk Perceptions and Purchase Intent.	Psychology & Marketing
6	Beitzen-Heineke, E. F., Balta-Ozkan, N., & Reefke, H.	2017	The prospects of zero-packaging grocery stores to improve the social and environmental impacts of the food supply chain	Journal of Cleaner Production
7	Belavina, E., Girotra, K., & Kabra, A.	2017	Online Grocery Retail: Revenue Models and Environmental Impact.	Management Science
8	Bottani, E., Mannino, F., Vignali, G., & Montanari, R.	2018	A routing and location model for food waste recovery in the retail and distribution phase	International Journal of Logistics: Research & Applications
9	Broekmeulen, R. A. C. M., & van Donselaar, K. H.	2019	Quantifying the potential to improve on food waste, freshness and sales for perishables in supermarkets.	International Journal of Production Economics
10	Cicatiello, C., Franco, S., Pancino, B., & Blasi, E.	2016	The value of food waste: An exploratory study on retailing.	Journal of Retailing & Consumer Services
11	Cooremans, K., & Geuens, M.	2019	Same but Different: Using Anthropomorphism in the Battle Against Food Waste.	Journal of Public Policy & Marketing
12	Devin, B., & Richards, C.	2018	Food Waste, Power, and Corporate Social Responsibility in the Australian Food Supply Chain.	Journal of Business Ethics
14	Dreyer, H. C., Dukovska-Popovska, I., Yu, Q., & Hedenstierna, C. P.	2019	A ranking method for prioritising retail store food waste based on monetary and environmental impacts.	Journal of Cleaner Production
15	Fikar, C.	2018	A decision support system to investigate food losses in e-grocery deliveries.	Computers & Industrial Engineering
16	Filimonau, V., & Gherbin, A.	2017	An exploratory study of food waste management practices in the UK grocery retail sector	Journal of Cleaner Production
17	Fujii, H., & Kondo, Y.	2018	Decomposition analysis of food waste management with explicit consideration of priority of alternative management options and its application to the Japanese food industry from 2008 to 2015	Journal of Cleaner Production
18	Gokarn, S., & Kuthambalayan, T. S.	2017	Analysis of challenges inhibiting the reduction of waste in food supply chain	Journal of Cleaner Production
19	Gollnhofer, J. F.	2017	Normalising alternative practices: the recovery, distribution and consumption of food waste.	Journal of Marketing Management
20	Gollnhofer, J. F., & Schouten, J. W.	2017	Complementing the Dominant Social Paradigm with Sustainability.	Journal of Macromarketing
21	Grewal, L., Hmurovic, J., Lamberton, C., & Reczek, R. W.	2019	The Self-Perception Connection: Why Consumers Devalue Unattractive Produce.	Journal of Marketing
22	Gruber, V., Holweg, C., & Teller, C. (2016).	2016	What a Waste! Exploring the Human Reality of Food Waste from the Store Manager's Perspective.	Journal of Public Policy & Marketing
23	Hamilton, S. F., & Richards, T. J.	2019	Food Policy and Household Food Waste	American Journal of Agricultural Economics
24	Hanssen, O. J., Vold, M., Schakenda, V., Tufte, P.-A., Møller, H., Olsen, N. V., & Skaret, J.	2017	Environmental profile, packaging intensity and food waste generation for three types of dinner meals	Journal of Cleaner Production
25	Hodge, K. L., Levis, J. W., DeCarolis, J. F., & Barlaz, M. A.	2016	Systematic Evaluation of Industrial, Commercial, and Institutional Food Waste Management Strategies in the United States	Environmental Science & Technology
26	Ilyuk, V.	2018	Like throwing a piece of me away: How online and in-store grocery purchase channels affect consumers' food waste.	Journal of Retailing & Consumer Services
27	Janssen, L., Sauer, J., Claus, T., & Nehls, U.	2018	Development and simulation analysis of a new perishable inventory model with a closing days constraint under non-stationary stochastic demand.	Computers & Industrial Engineering
28	Juvan, E., Grün, B., & Dolnicar, S.	2018	Biting Off More Than They Can Chew: Food Waste at Hotel Breakfast Buffets	Journal of Travel Research
29	Katajajuuri, J.-M., Silvennoinen, K., Hartikainen, H., Heikkilä, L., & Reinikainen, A.	2014	Food waste in the Finnish food chain	Journal of Cleaner Production
30	Kiil, K., Dreyer, H. C., Hvolby, H.-H., & Chabada, L. https://doi.org/10.1080/09537287.2017.1384077	2018	Sustainable food supply chains: the impact of automatic replenishment in grocery stores	Production Planning & Control
31	Kulikovskaja, V., & Aschemann-Witzel, J.	2017	Food Waste Avoidance Actions in Food Retailing: The Case of Denmark.	Journal of International Food & Agribusiness Marketing
32	Lee, D., & Tongarlak, M. H.	2017	Converting retail food waste into by-product.	European Journal of Operational Research
33	Lee, K. C. L.	2018	Grocery shopping, food waste, and the retail landscape of cities: The case of Seoul	Journal of Cleaner Production
34	Marx, P. N. J. M. M., & Erasmus, A. C.	2014	Status consciousness and knowledge as potential impediments of households' sustainable consumption practices of fresh produce amidst times of climate change	International Journal of consumer Studies
35	Midgley, J. L.	2014	The logics of surplus food redistribution.	Journal of Environmental Planning & Management
36	Mirabella, N., Castellani, V., & Sala, S.	2014	Current options for the valorization of food manufacturing waste: a review	Journal of Cleaner Production
37	Naidoo, M., & Gasparatos, A.	2018	Corporate environmental sustainability in the retail sector: Drivers, strategies and performance measurement	Journal of Cleaner Production
38	Pearson, D., & Perera, A.	2018	Reducing Food Waste	Social Marketing Quarterly
39	Prokopović, K. S., Prokopović, T. B., & Jelić, M. A.	2016	Information Technologies in Integrated Logistics.	Ekonomika
40	Reicks, O.	2016	Waste Not, Hunger Not: The Logistical Solution. Bringing Smallholder Farmers to the Market using Third-Party Logistics Providers.	Journal of Food Distribution Research
41	Setti, M., Banchelli, F., Falasconi, L., Segrè, A., & Vittuari, M.	2018	Consumers' food cycle and household waste. When behaviors matter	Journal of Cleaner Production
42	Sosna, D., Brunclíková, L., & Galeta, P.	2019	Rescuing things: Food waste in the rural environment in the Czech Republic	Journal of Cleaner Production
43	Spada, A., Conte, A., & Del Nobile, M. A	2018	The influence of shelf life on food waste: A model-based approach by empirical market evidence	Journal of Cleaner Production
44	Teller, C., Holweg, C., Reiner, G., & Kotzab, H.	2018	Retail store operations and food waste	Journal of Cleaner Production
45	Tichenor, N. E., Peters, C. J., Norris, G. A., Thoma, G., & Griffin, T. S.	2017	Life cycle environmental consequences of grass-fed and dairy beef production systems in the Northeastern United States	Journal of Cleaner Production
46	Tjärnemo, H., & Södahl, L.	2015	Swedish food retailers promoting climate smarter food choices—Trapped between visions and reality?	Journal of Retailing & Consumer Services
47	Tromp, S.-O., Haijema, R., Rijgersberg, H., & van der Vorst, J. G. A. J.	2016	A systematic approach to preventing chilled-food waste at the retail outlet.	International Journal of Production Economics
48	Xu, Y., & Szmerekovsky, J.	2017	System dynamic modeling of energy savings in the US food industry	Journal of Cleaner Production
49	Young, C. W., Russell, S. V., Robinson, C. A., & Chintakayala, P. K.	2018	Sustainable Retailing – Influencing Consumer Behaviour on Food Waste.	Business Strategy & the Environment (John Wiley & Sons, Inc)