



**GUIDE ADRESSED TO SPECIALISTS  
IN THE COMMERCIAL DISTRIBUTION  
LINK FOR THE REDUCTION OF FOOD  
WASTE FOR FLOUR PRODUCTS**





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**ROMPAN**



# **GUIDE ADDRESSED TO SPECIALISTS IN THE COMMERCIAL DISTRIBUTION LINK FOR THE REDUCTION OF FOOD WASTE FOR FLOUR PRODUCTS**

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**„Methods to reduce food waste in flour products by developing the specific competence of  
specialists in the sector - Stop Waste to VET”**

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**Chapter 1 - The main causes of food waste on the distribution-merchandising chain in the flour products industry**

Food waste is a serious problem that impacts every step of the supply chain, *including the retail stage*. The intricacy of the food waste problem, the interdependencies between the many food supply chain stages and their stakeholders, as well as the need of information exchange, are all depicted in several conceptual studies (Teller et al., 2018).

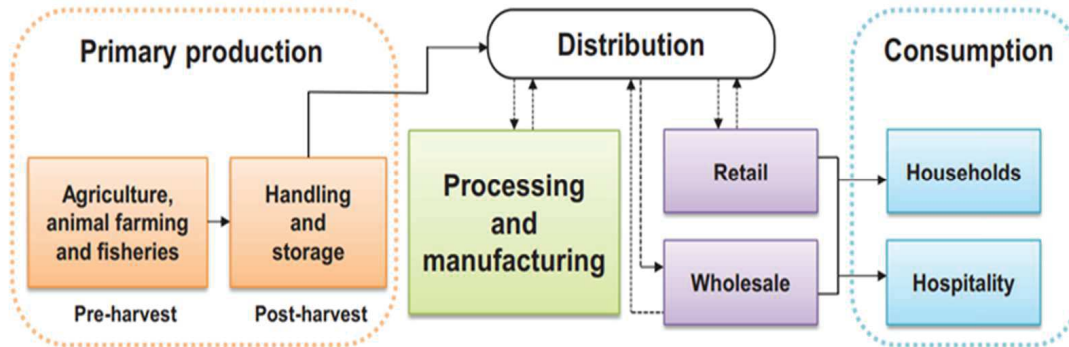


Fig 1.1. Steps in the food supply chain where flour products can be lost or thrown away. (adapted from Jeswani et al., 2021)



According to accepted definitions, **bread waste** is any bread that is produced with the intention of being consumed by humans and has completed the food supply chain up to the final bread product, that is suitable for human consumption but is not consumed by humans due to being discarded, whether or not it is left to expire or spoil. Bread that has been donated will not be considered food waste. Bread waste will also include bread used for animal feed and biofuel (Balasooriya, 2022).

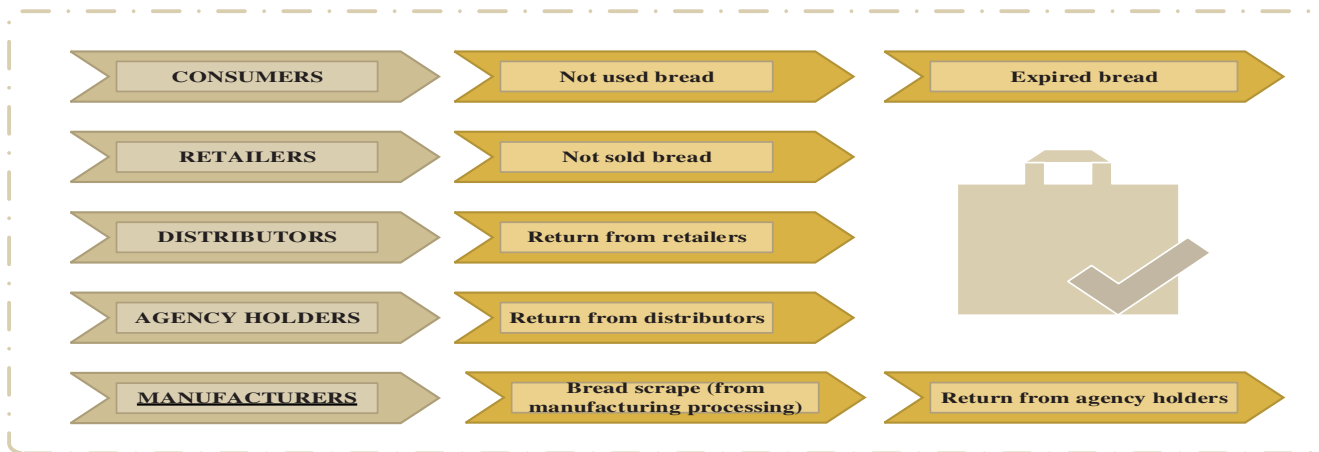
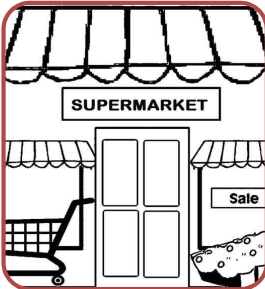


Fig 1.2. Bread waste type and its source (adapted according to Bhardwaj et al., 2022)



The manner in which food is produced and delivered must be changed due to an expanding population and a deteriorating resource shortage. The consumer sector, which includes retail, food services, and homes, is responsible for over two thirds of all food waste in Europe. When it comes to reducing food waste, retail is crucial. **It was estimated that 5% of the food waste in the EU comes from the grocery wholesale and retail sector using data from the European Statistical Office (Eurostat).**



According to Cicatiello et al.,2016 a single supermarket **wastes the equivalent of 469 portions of bread per day.** The average cost of food waste at European supermarkets is 1.6% of net sales, and for the poorest supermarket chains, it is over 4%. This results in annual food waste costs for the German grocery retail industry of roughly 2 billion euro, significantly more than the overall cost of transportation. Reduced food waste may quadruple the profit margins of grocery stores, whose margins are typically between 2 -3%.



Due to fierce competition and the need to generate sales, retailers frequently put availability first. As sales are typically boosted by full shelves, they frequently overstock their displays.

Additionally, the grocery stores and supermarkets increase their product lines to satisfy customers' demands for a broad selection of items.

This implies that merchants must choose between maximizing the appeal of their stores by wider selections and huge inventories on the one hand, and reducing the negative effects of overstock on the environment, society, and the economy on the other.

But also, bread food waste occurs during distribution and for other categories such as: conventional bread, pre-packed and bake-off products.

Bake-off items are baked in retail stores using pre-made dough or par-baked products provided by a bakery.

Bake-off and pre-packaged bread products have a somewhat limited shelf life, with pre-packaged bread generally lasting one to ten days and one day for bake-off bread. Crispbread has a longer shelf life, which may last up to a year.





Food waste in the retail sector refers to items that can't be sold and must be thrown away or repurposed. Because of the low overall margins on food goods and the rising operational expenses, especially at the store level, food waste at the retail stage poses a serious business problem.



The fact that a significant fraction of the items thrown out are still fit for ingestion presents another challenge for grocery merchants.



Retailers are under growing pressure due to the ethical nature of food waste to demonstrate corporate social responsibility in terms of the environment and communities and, as a result, to decrease as well as recover food waste (Aiello et al., 2014; Gruber et al., 2016).



## ***Causes of food waste on the distribution – merchandising chain in the flour products industry***

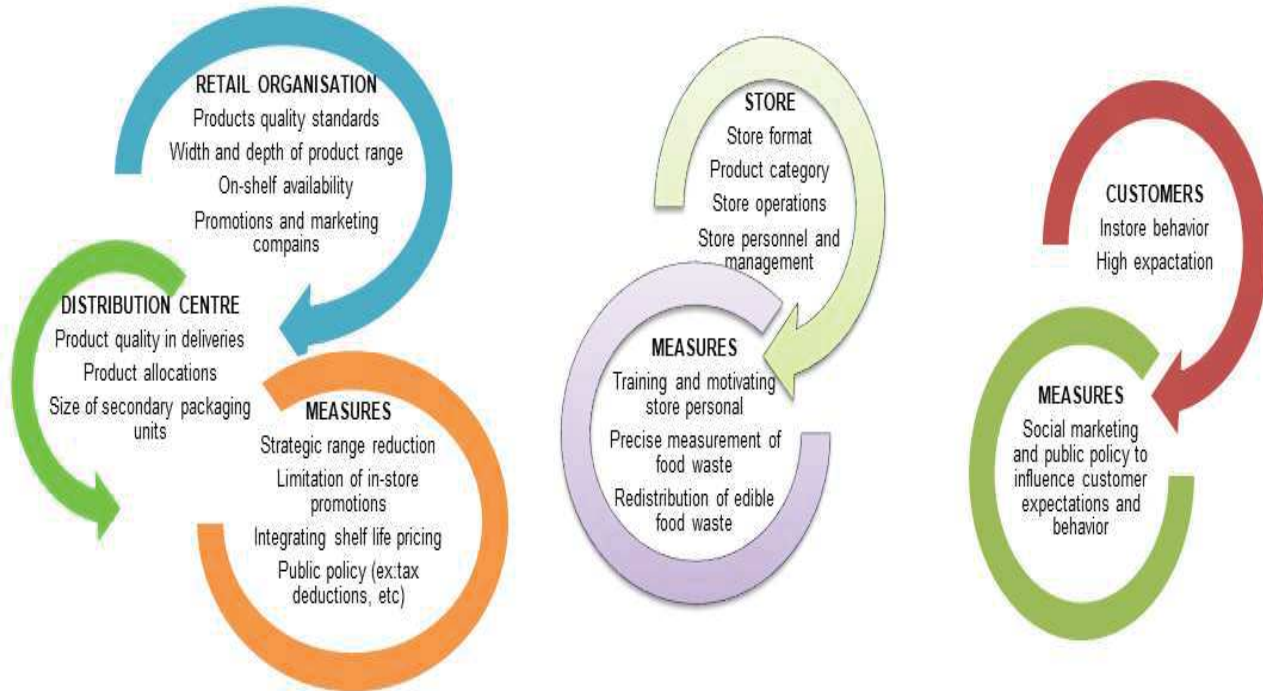
There are many different reasons why food waste happens at the distribution level.



**Fig 1.3. Food waste/Flour products waste  
in retail store (adapted from Teller et al., 2018)**

### Main reasons for food waste

- Unfavorable consumer behavior
- Fluctuating demand
- Ineffective store operations
- Replenishment procedures



**Fig 1.4. Root causes and measures of prevention and reduction in flour products waste (adapted from Teller et al., 2018)**

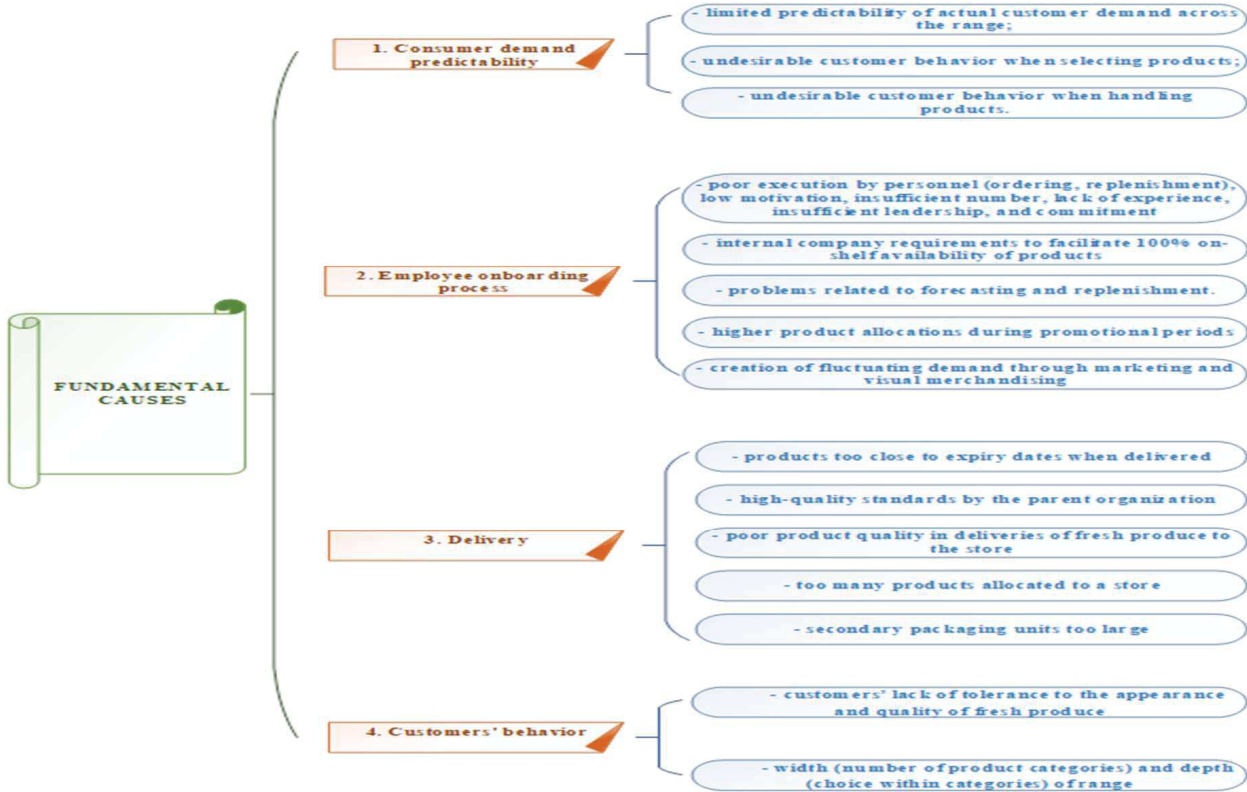


Fig 1.5. The fundamental and main root causes of food waste in the distribution chain



Overall, the root causes are related to traditional grocery retailing challenges, such as (figure 1.6) :

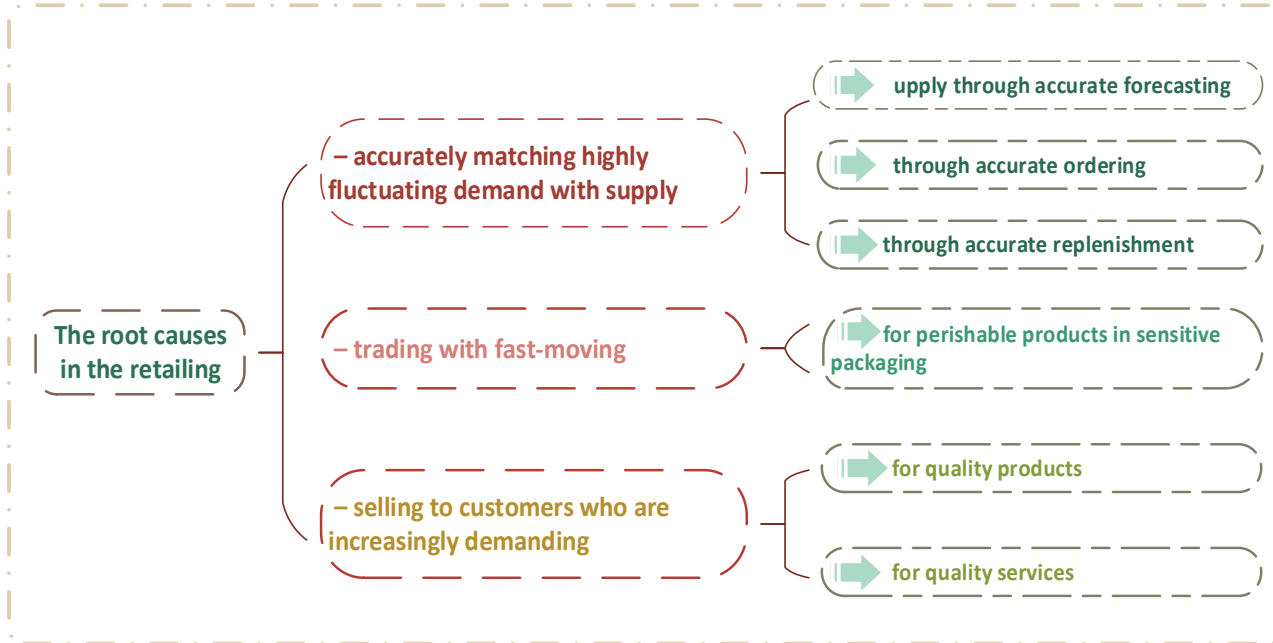
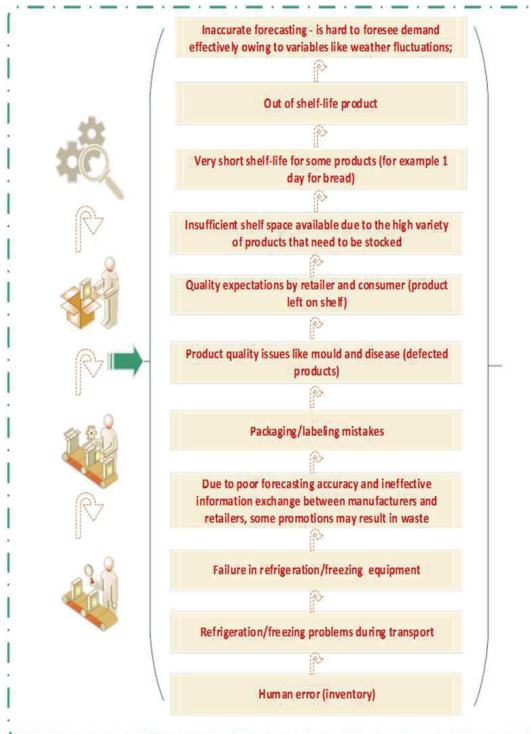


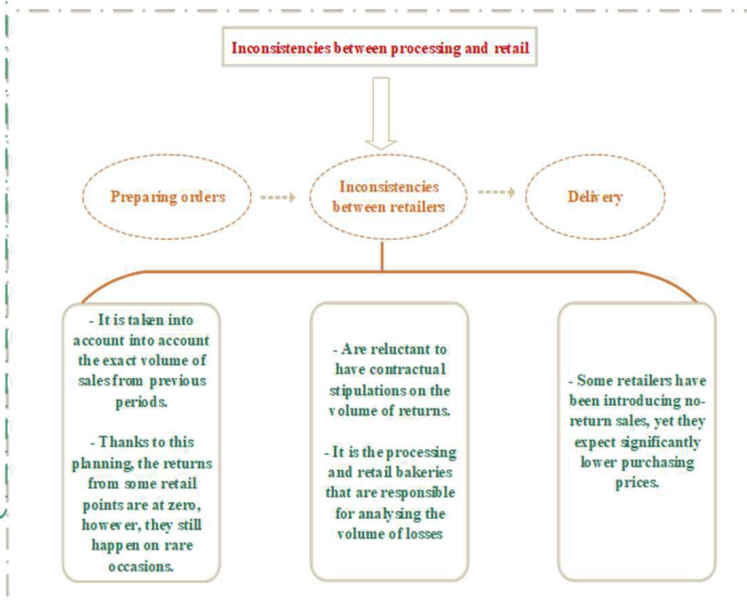
Fig 1.6. The root causes in the retailing





**Fig 1.7. The causes of food waste for bread, biscuits and other flour products (adapted according to Mena et al., 2011)**

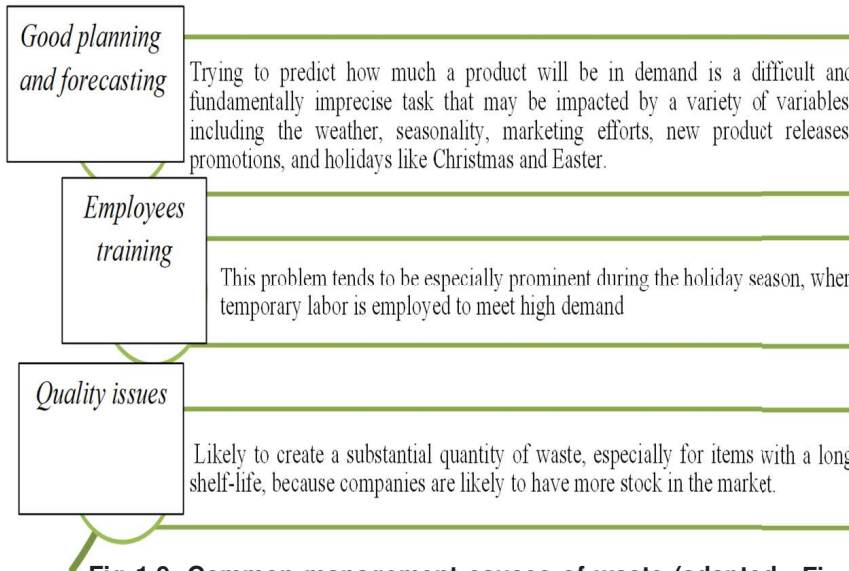
Another study carried out by Gorynska-Goldmann et al., 2021 presents the causes for reducing food losses in the baking and confectionery industry. In this study the following inconsistencies between processing and retail were identified (figure 1.8):



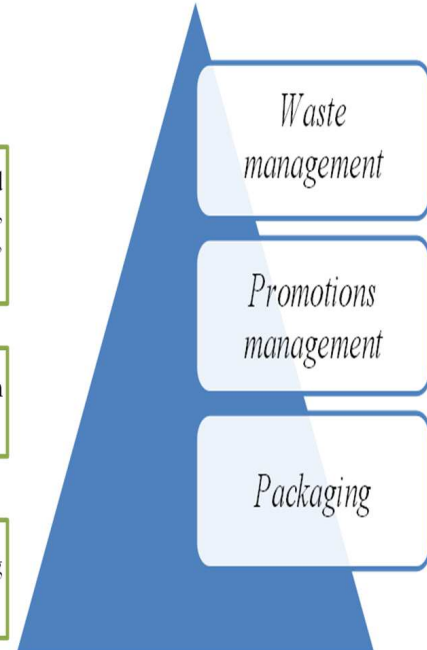
**Fig 1.8. Inconsistencies between processing and retail**



**Good planning and forecasting depend on timely, accurate information. Variations between prediction and orders may rise when there is little information, which might result in waste.**



**Fig 1.9. Common management causes of waste (adapted from Mena et al., 2011)**



**Fig 1.10. Other common management causes of waste (adapted from Mena et al., 2011)**



**Waste management policy.** While some companies have very defined roles and duties for waste management, others may not have a distinct waste job inside the company. This often indicates that waste is not consistently tracked and controlled, which will likely result in more waste.



**Promotions management.** Promotions in food retail are a crucial tactic for increasing traffic and sales. However, owing to competition, they have the potential to produce more unpredictable patterns of demand. Increased unpredictability can result in overproduction and waste, especially for baked goods with a limited shelf life.

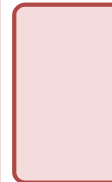


**Packaging.** Waste may be impacted by packaging in two separate ways. On the one hand, it reduces waste since it shields the baked goods from harm and may help some baked goods last longer on the shelf. On the other side, excessive packing should be avoided because it will eventually be wasted, either along the supply chain or at the point of consumption. (Mena et al., 2011)

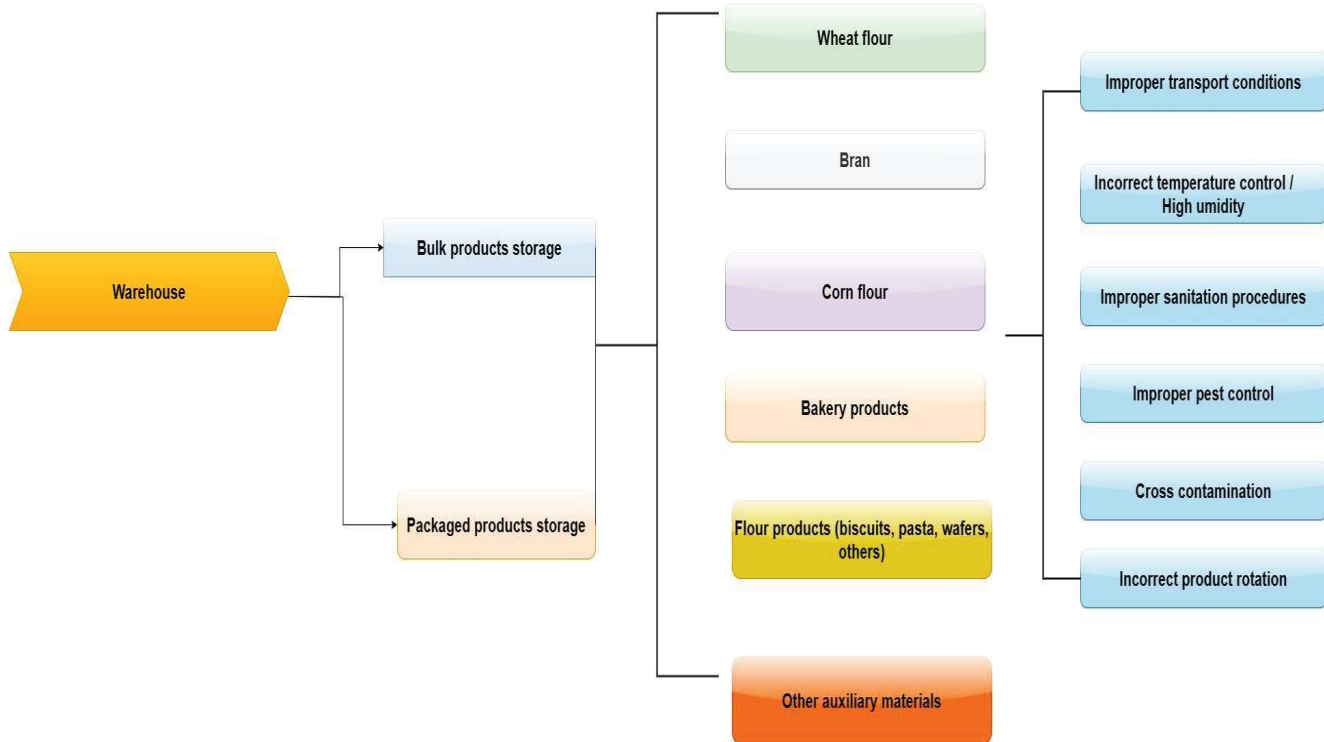


### **Training of employees.**

Employees may fail to follow stacking, shelving, and stock rotation protocols in some situations, resulting in waste.



**Quality issues.** Rejections and even product recalls can result from quality issues. While quality difficulties might result in waste, it appears that the loss of product quality is more significant to the firms than the waste produced.



**Fig. 1.11 Causes of food waste identified in the distribution and marketing chain for flour-based products**

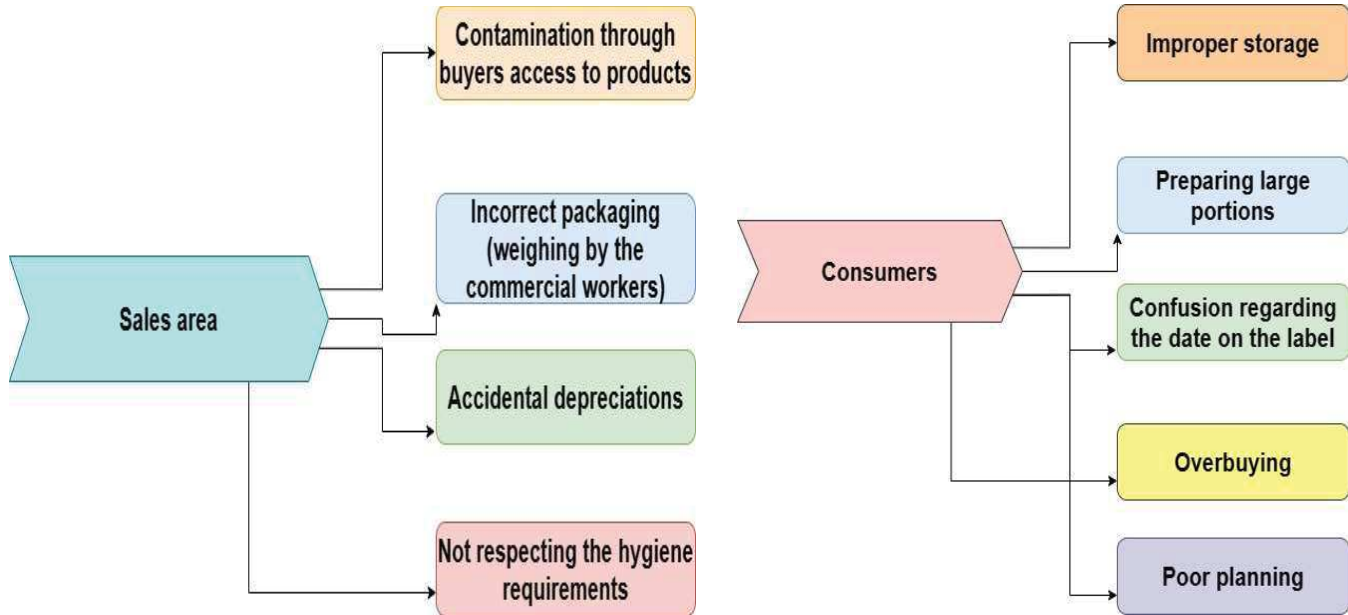


Fig. 1.12 Causes of food waste identified in the distribution and marketing chain for flour-based products





## Chapter 2 - Correlation of legislative framework and the internal procedures on distribution and merchandising chain in the flour products industry



The flour industry plays a vital role in the supply of staple foods.



Committee on World Food Security (CFS) calls on all public, private and civil society actors to create an enabling environment based on the hierarchy of “food use-not-loss-or-waste” especially for monitoring and measurement targets.



The International Food Policy Research Institute (IFPRI) conducts research to provide innovative, evidence-based policy solutions that enhance food security and fight poverty. One cutting-edge study measures food loss and waste at all stages – from production and post-production to processing, distribution and consumption – in order to identify the origin and cost of food waste and loss at the local, regional and global level



**In the flour products industry, the correlation between the legislative framework and internal procedures is of paramount importance, particularly when viewed from the perspective of reducing food waste.**



**By adopting internal procedures that align with standards and legislation in force, manufacturers, distributors and merchandisers can achieve a more sustainable and responsible food distribution and merchandising chain.**



**These efforts not only benefit the environment but also enhance consumer trust and contribute to reducing food waste, which is a global concern.**



### European legislation:

- **Council Directive 1999/31/EC** of 26 April 1999 on landfill
- **Directive 2008/98/EC** of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives
- **Directive (EU) 2018/851** of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste
- **Directive (EU) 2018/850** of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on waste disposal
- **Commission Delegated Decision (EU) 2019/1597 of 3 May 2019** supplementing Directive 2008/98/EC of the European Parliament and of the Council with regard to the common methodology and minimum quality requirements for the uniform measurement of food waste levels.
- **Regulation (EC) no. 178/2002** - General principles and requirements of food law, establishing the European Food Safety Authority and establishing procedures in the field of food safety

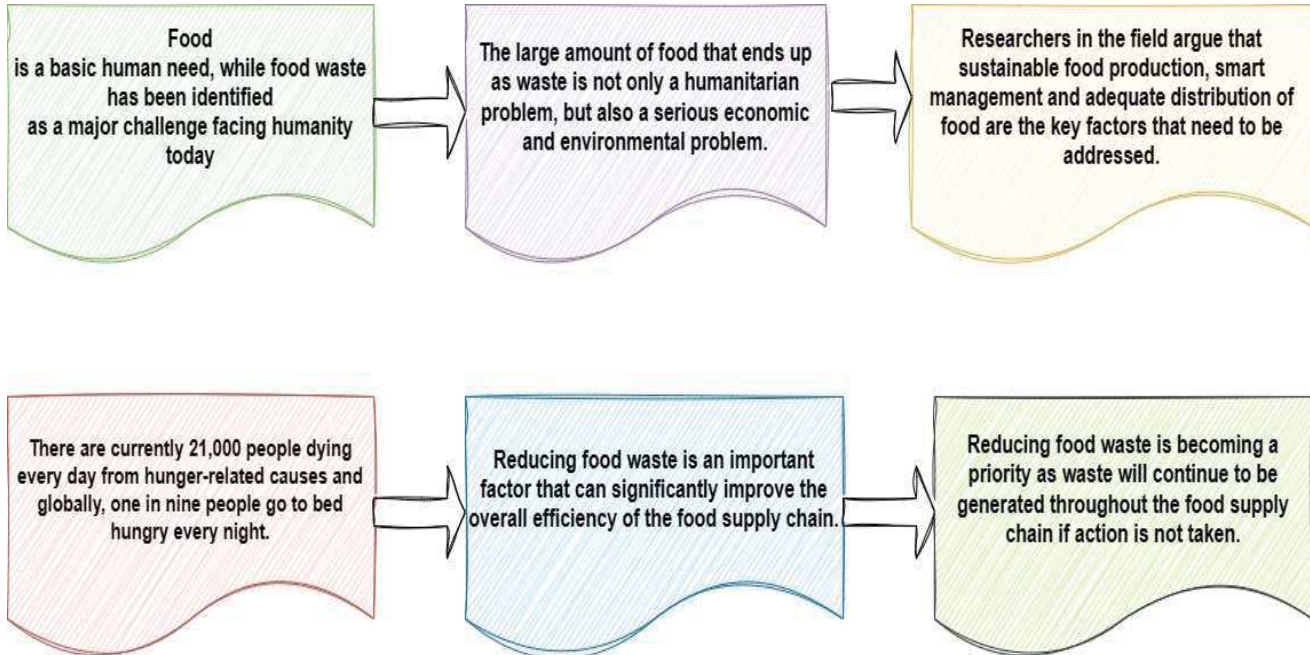
The legislative framework that applies to the flour products industry varies from one country to another. However, there are several common regulations and standards.

### Romanian legislation

- **Law no. 217 of November 17, 2016** regarding the reduction of food waste
  - **HG decision no. 51/2019**
- **Methodological norms for the application of Law no. 217/2016** regarding the reduction of food waste.



## FOOD WASTE





## Procedures and strategies in the flour products industry

**Internal processes** in the flour industry encompass a wide range of processes, from production and supply chain management to marketing and distribution. These procedures are essential to minimize food waste.

**Procedure for controlling the production process and quality:** manufacturers implement strict quality control measures to obtain safe products - testing and permanent monitoring of raw materials and finished products.

**Supply chain management:** An efficient supply chain is essential to deliver flour products to distributors and retailers on time. Manufacturers carefully plan their production schedules, keep real-time inventory records and establish logistics distribution networks. Effective inventory management practices help manufacturers and distributors reduce waste by preventing overstocks.

**Waste reduction strategies:** manufacturers and distributors that implement food waste reduction strategies in their internal procedures can reduce the volume of waste, thus contributing to environmental sustainability (Garrone et al., 2016).

**Consumer awareness:** Implementation of consumer training and information campaigns - clear understanding of the information included in the labels of flour products





## Procedures and strategies in the flour products industry

**Distribution Strategies:** Companies develop distribution strategies to determine the most effective ways to bring products to market.

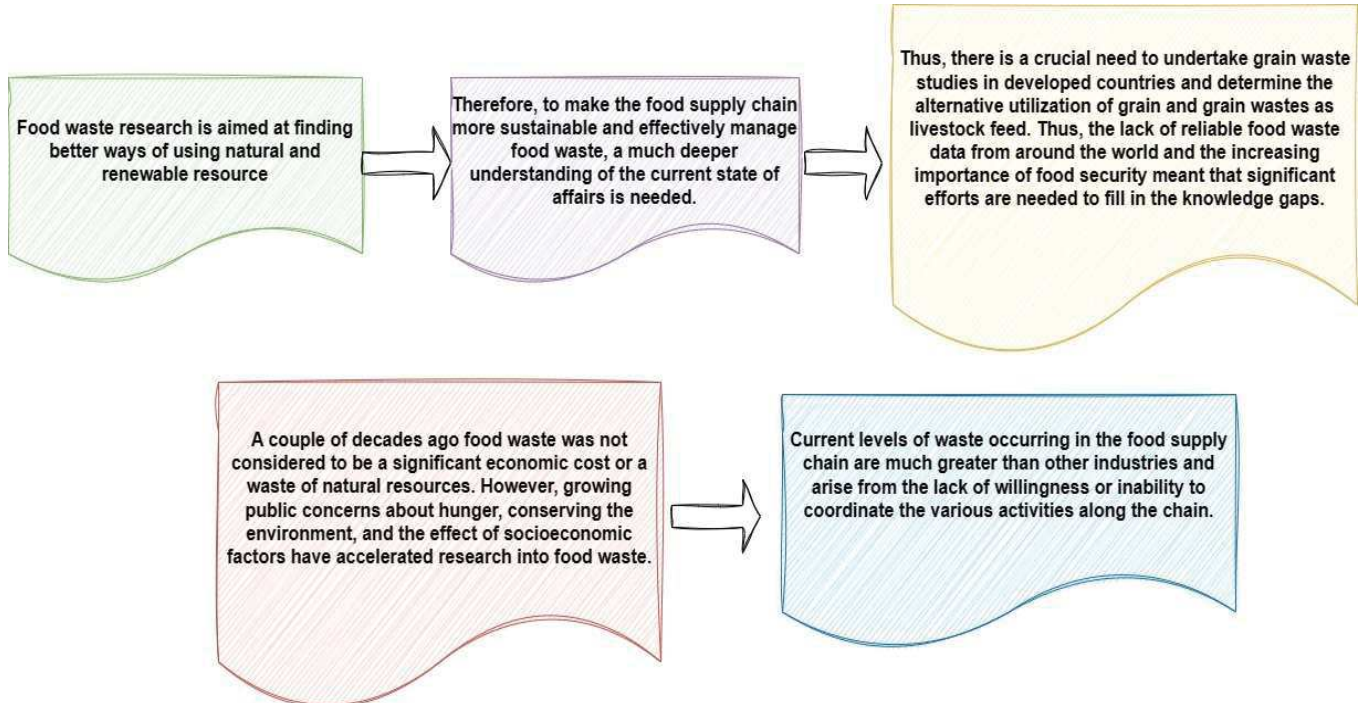
**Marketing and commercialization:** through this procedure, the strategy will be established that will be used depending on the type of flour product provided, so as to avoid food waste.

**Traceability:** each participant in the distribution - marketing chain should have the ability to identify the origin and destination of the products supplied, thus ensuring traceability (Zhang & Bhatt 2014).

**Donations/Sustainability:** Companies in the flour industry have implemented internal procedures that promote food donation and sustainability. They work with food banks, non-profit organizations and engage in recycling and waste reduction programs to minimize waste (Bierma et al., 2019).



## FOOD WASTE





## Technical Platform on the Measurement and Reduction of Food Loss and Waste

Sustainable Development Goal (SDG) 12, of Agenda 2030, seeks to “ensure sustainable consumption and production patterns.” Target 12.3 of that goal aims to “by 2030, halve the per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses.”

FAO and the UN Environment Programme are making efforts in order to measure the progress made towards achieving SDG 12.3 using two separate indices – the Food Loss Index (FLI), led by FAO and the Food Waste Index (FWI), led by UN Environment.

The G20 recommendation to reduce FLW was followed by the agreement between FAO and the International Food Policy Research Institute (IFPRI) to set up the Technical Platform to measure and reduce food loss and waste.

Launched in December 2015, the Technical Platform facilitates information-sharing and in-depth discussion. The platform builds on and complements existing initiatives by FAO and CGIAR Research Program on Policies, Institutions, and Markets, which includes an initiative on measuring and reducing food loss and waste

Fig. 2.1 Adaptation from: <https://www.fao.org/platform-food-loss-waste/background/en>



## Food Loss Reduction

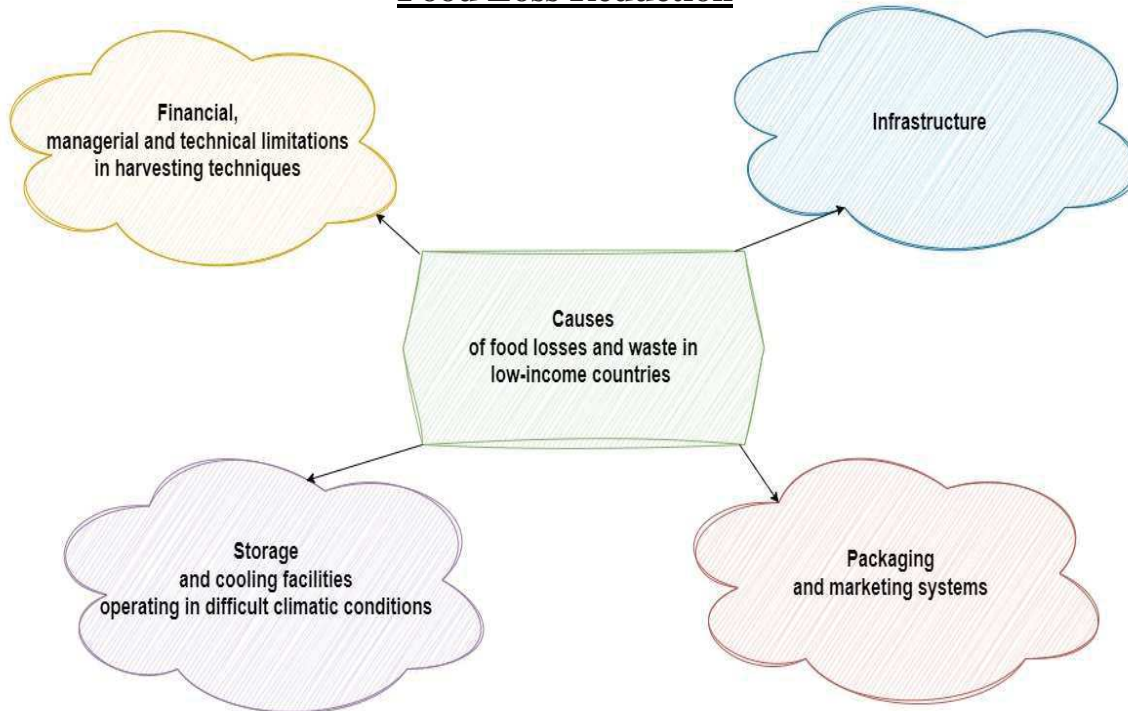


Fig. 2.2 Adaptation from: FAO, 2011. Global food losses and food waste: extent, causes and prevention

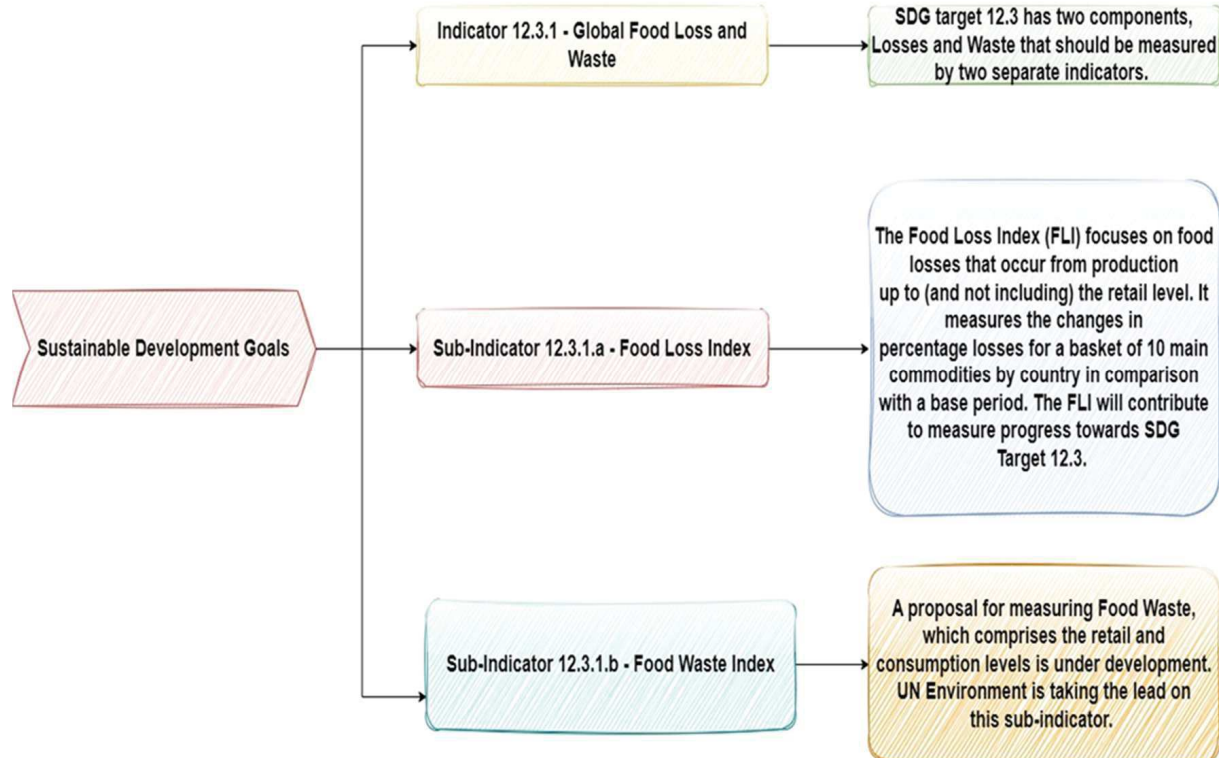


Figure 2.3. Adaptation after: <https://www.fao.org/sustainable-development-goals/indicators/1231/en/>



## **Chapter 3 - Procedures and means for reducing food waste on the distribution and merchandising chain in the flour products industry**

One of the biggest issues on the planet is retail food waste, which results in billions in lost income and harms both natural and human resources. According to Cicatiello et al. (2017), In a year, 70.6 tons of food (for a value of nearly 170,000 €) is wasted, mostly bread and fresh fruit and vegetables.

Methane is a greenhouse gas that, according to the United Nations Environmental Program (UNEP), causes one million preventable deaths per year. Food waste also has a detrimental impact on resources used in the retail sector, including labor, water, processing, packing, storage, and transportation (<https://linkretail.com/5-retail-food-waste-management-strategies/>).

Retail food waste management techniques can help to enhance the efficiency of store operations, lower hazards, control waste, boost profits, and more.









Based on the analysis carried out by researchers in recent studies, there are 6 areas for action to reduce food waste for fresh flour products. Figure 1 illustrates these waste reduction methods and shows the interrelationships between them.

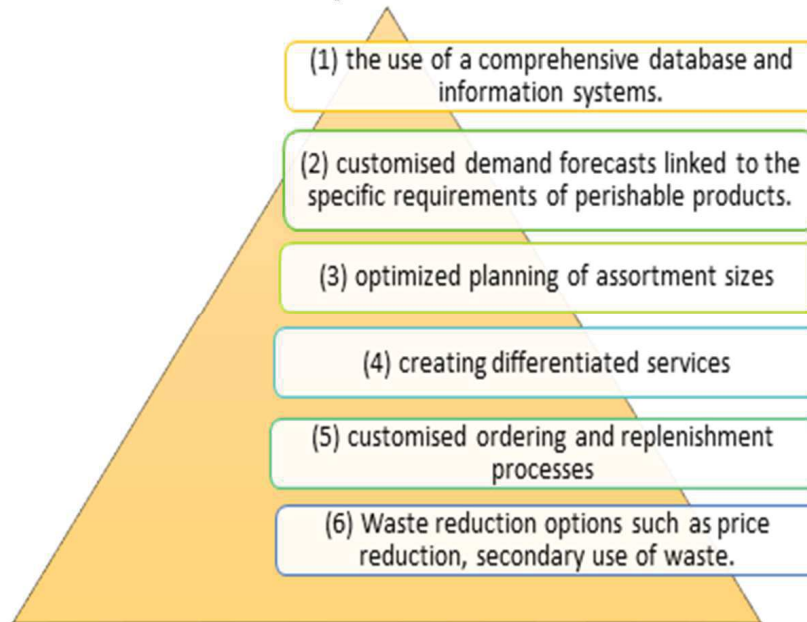
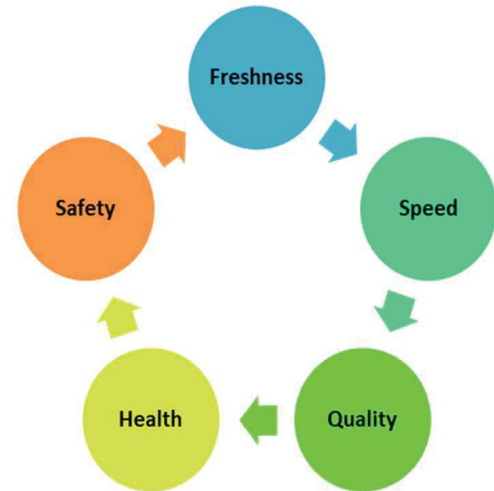
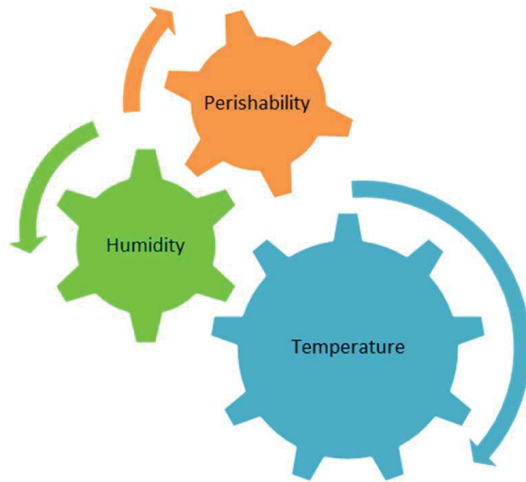


Figure 1. Waste reduction methods and interrelationships between them (Riesenegger, L.; Hübner, A., 2022)



Food distribution management, as well as high customer expectations and difficult supplier-customer relationships, are particularly difficult areas due to requirements such as (Aljohani, K., 2023)

As food products often have a relatively limited shelf life and are transported to customers (both traders and end users) by vans and trucks, bread factories have measures aimed at the following aspects:





One-third of all food produced for human consumption is thought to be lost in supply networks or squandered by consumers (Ishangulyyev, R.; et al., 2019). No exemption to this regulation applies in bakeries. Up to 30% of a large bakery’s output may be lost due to never reaching the consumer as it is not sold before the best-before date (Ghosh, R.; Eriksson, M., 2019).

Several studies have been carried out on food supply chains, logistics and distribution network design. Arabsheybani and Arshadi Khasmeh 2021, proposed a model for coordinating production planning, distribution, supplier selection and order allocation for a robust and resilient distribution network in the bakery industry. Yadav et al., 2021, developed a multi-objective, multi-channel food distribution network model that minimizes total cost, emissions, and delivery time.

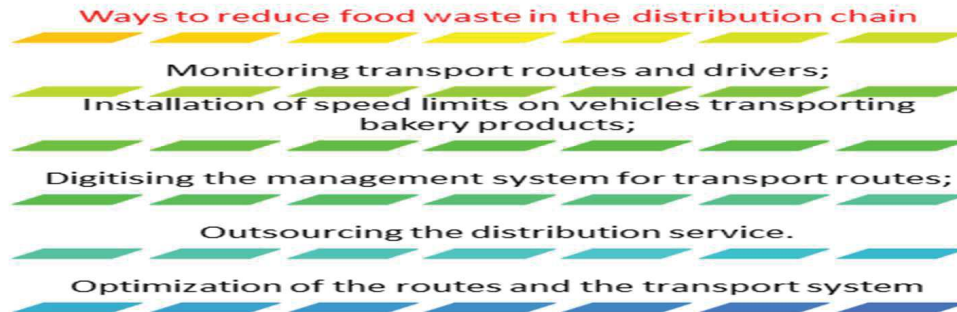


Figure 3.2. Methods for reducing food wastes through the distribution chain (Gorynska-Goldmann et al., 2021)



Retailers have an important role to play in combating food waste. However, managing an optimal stock and presenting a varied and attractive product mix to consumers is a constant challenge.



The balance becomes even more complex for those handling short shelf-life products, such as supermarkets and convenience stores.



By contributing, retailers will be able to make a positive impact while reducing their carbon footprint and improving their profitability.



<p><b><u>Improve the accuracy of demand forecasting by maintaining an aesthetically pleasing presentation for clients by keeping shelves stocked and full</u></b></p>	<p>Maintaining inventory levels higher than are strictly necessary is the simplest approach to do this. But stocking up too much on a commodity increases the chance that it will spoil and go to waste. It is advised to regularly assess excess inventory and make necessary adjustments so that there is always the appropriate quantity of merchandise available.</p>
<p><b><u>Implement expiry projection systems</u></b></p>	<p>Product expiration is one of the major sources of food waste in retail establishments. Because items can no longer be sold beyond their expiration date, they are lost. Retailers can use analytical tools that warn retailers when items are going to expire so that they can take steps to manage them, including offering discounts.</p>
<p><b><u>Training store staff</u></b></p>	<p>Some modern retailers have established protocols to reduce waste, such as not restocking shelves with fresh food near closing time and letting their existing shelves run out. But this rule must be followed by employees, but unfortunately, retailers face a staff turnover rate of over 60%, making it difficult to implement and maintain food safety, storage and product management protocols. Therefore, extra effort should be made to ensure that all staff have up-to-date knowledge of protocols, thereby improving product handling and management in store and effectively reducing food waste.</p>



<p><u>Act before discarding</u></p>	<p>Retailers have a number of alternatives for handling items that are about to expire before determining whether to discard them. For instance, they may join with charities to give surplus items, sell used or slightly damaged goods at a discount, or find partners to compost food wastes. Each shop can establish its own procedures to increase product usability and reduce waste. However, as was already noted, putting management standards into practice will be crucial to ensuring that they are successful and do not only exist on paper.</p>
<p><u>Conduct waste audits</u></p>	<p>Waste audits should be conducted because, despite best efforts, imponderables might still arise and reduce effectiveness. Part of the answer is measuring in order to manage. To uncover excess tendencies or management issues impacting the outcomes, it is crucial to keep track of every instance and evaluate the underlying reasons of food waste. Setting up guidelines for relevant parties would provide the process of continual improvement structure.</p>

Table 3.1. Initiatives that can be implemented to reduce bakery waste by retailers  
(<https://frogmi.com/en/blog/5-initiatives-for-retailers-to-reduce-food-waste/>)



Along with fruit, vegetable, dairy, and meat items, bread waste represents a sizeable component of all food waste (Stensgrd & Hanssen, 2016). Bread is the product that is wasted the most frequently in Europe, according to Demirci et al. (2016).

Over time, many researchers and companies have tried to find better alternatives to reduce waste. In practice, most of the bread that is not consumed is usually disposed of as food waste (Verni et al., 2020).

In figure 3.2 are pointed out the ways that bread waste can be used for: (Iakovlieva M., 2021).

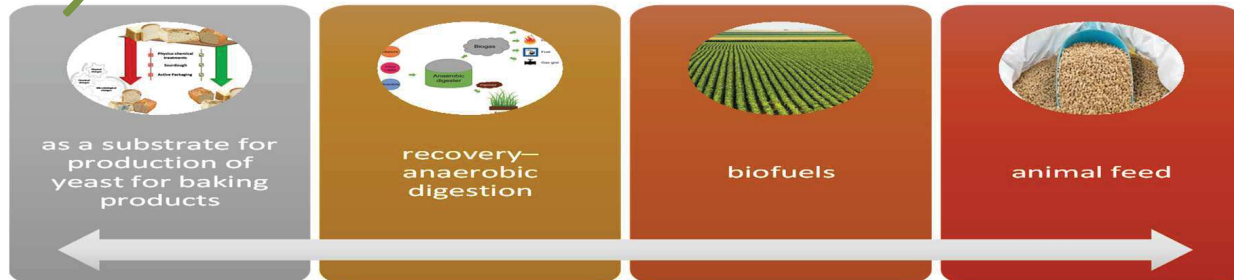
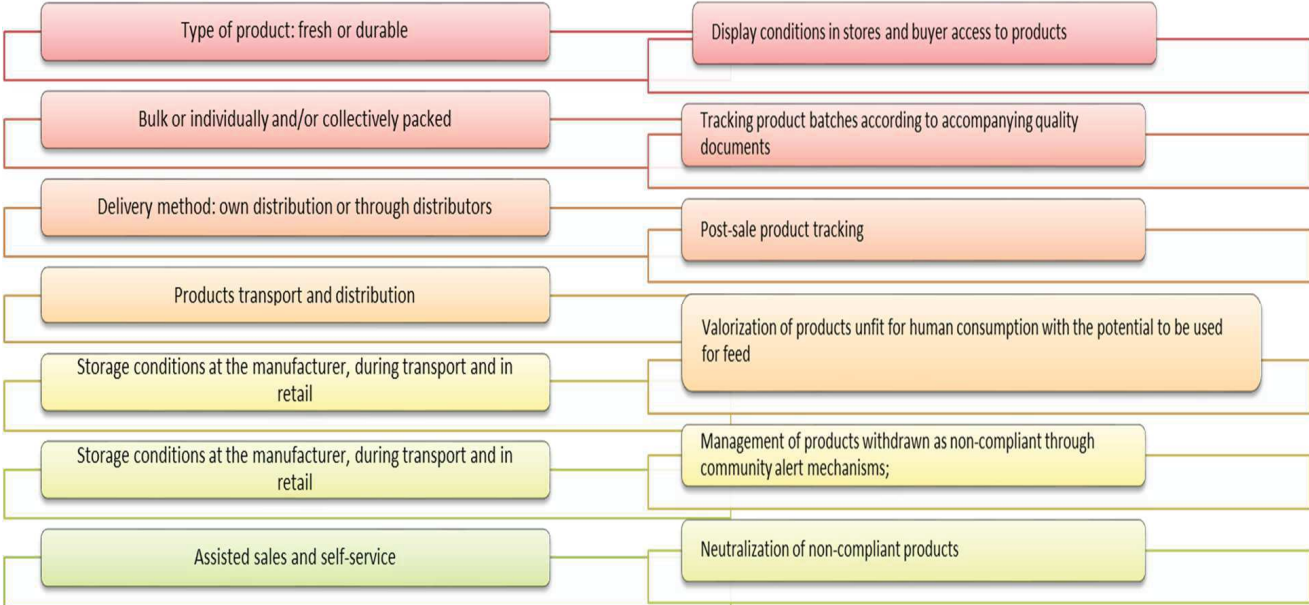


Figure 3.2. Recovery of bread waste (<https://ohioline.osu.edu/factsheet/fabe-6611>; <https://www.mdpi.com/2311-5637/4/1/9#>)



**At the level of each unit, a plan will be drawn up to combat food waste in the distribution and marketing chain for flour-based products.  
In order to monitor and reduce these effects, it will be based on aspects related to:**





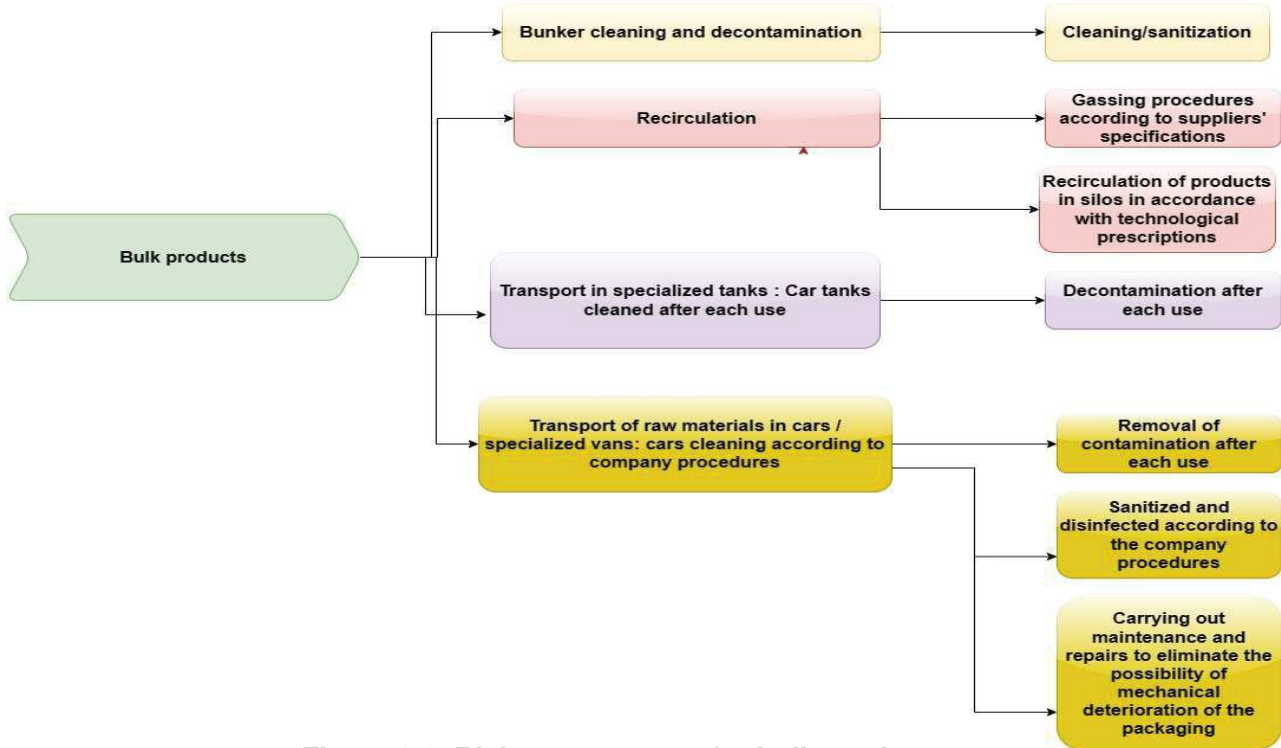


Figure 3.3. Risk management for bulk products

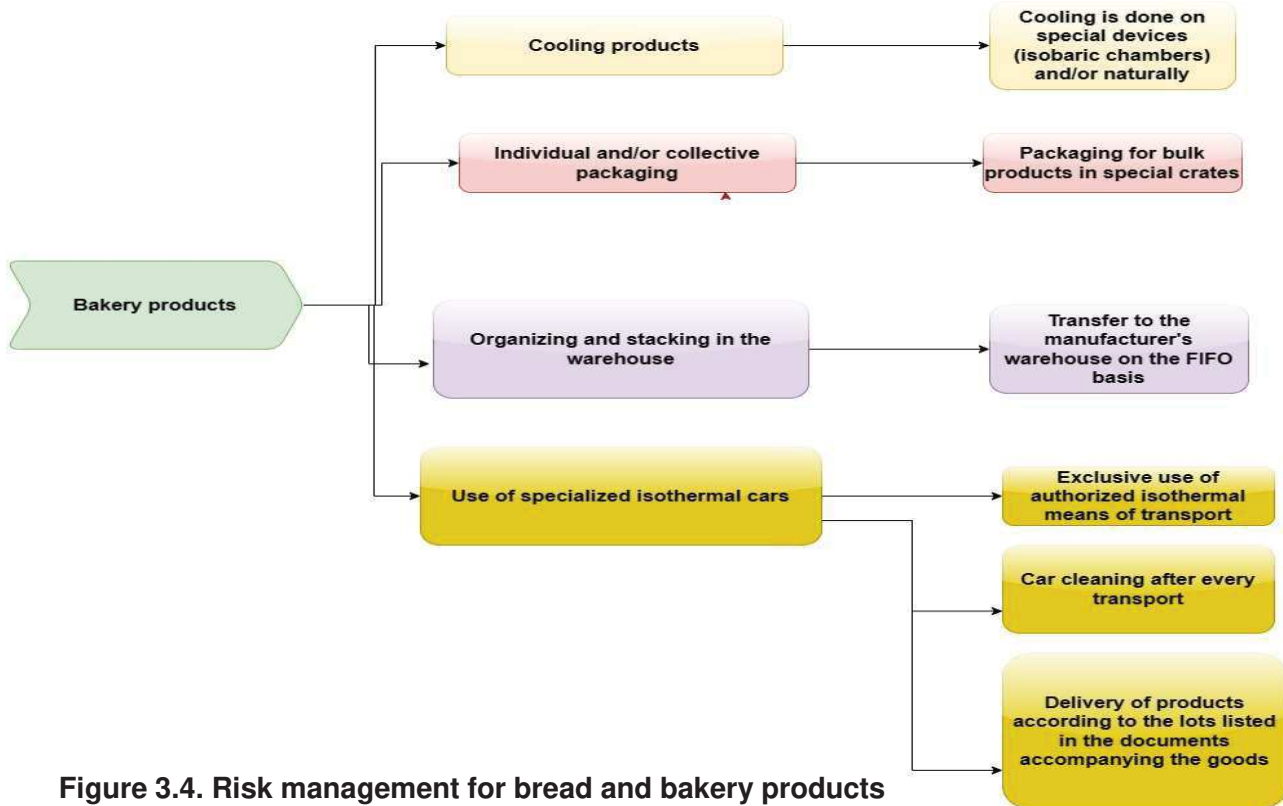


Figure 3.4. Risk management for bread and bakery products

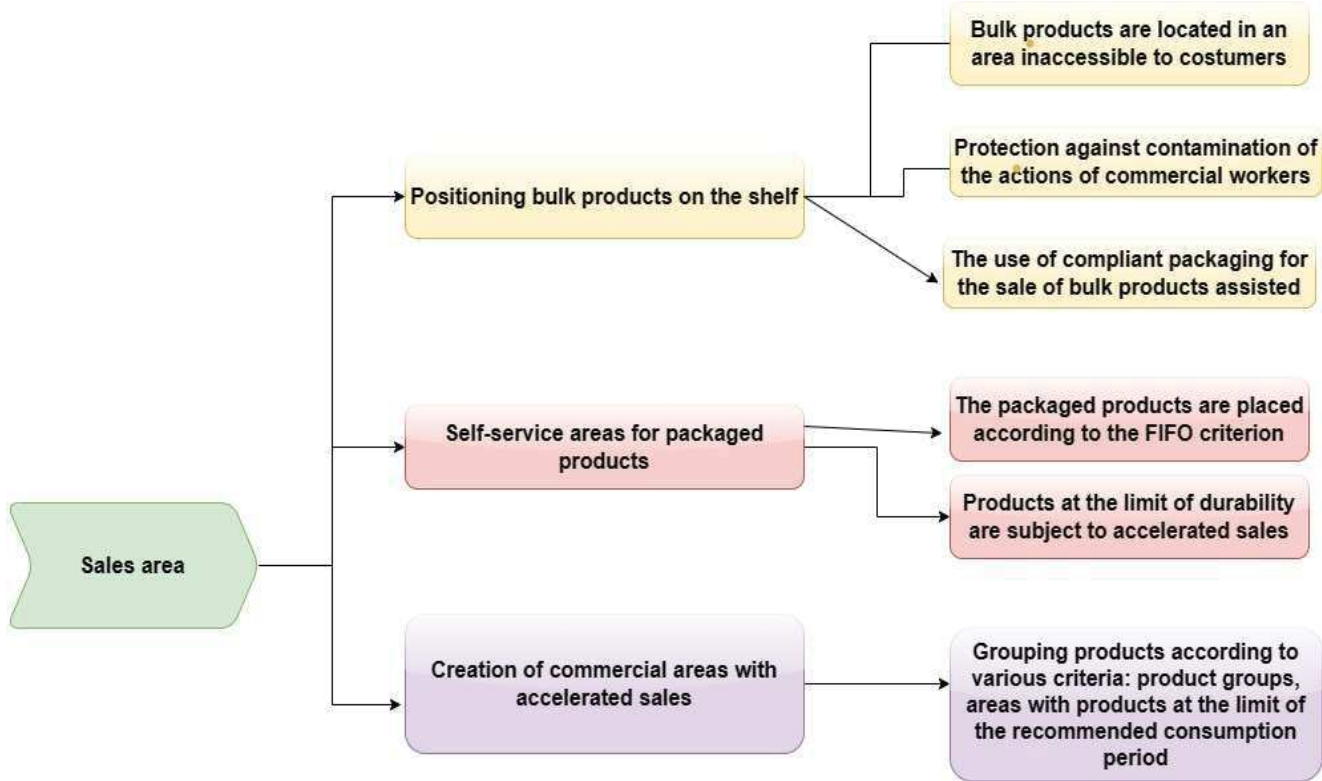


Figure 3.5. Risk management in the sales area



## Chapter 4 - Recommendations regarding the reduction of food waste on the distribution chain in the flour products industry

Using data from Eurostat, Stenmarck and co-authors (2016) made an estimation that the food wholesale and retail sector is accountable for 5% of food waste within the European Union. Despite the comparatively lower food waste indicator in the retail sector compared to other industries, significant efforts are directed toward curbing this issue. Several studies show that underlying factors contribute to this phenomenon, for example:



●Retailers serve as a crucial link connecting producers, processors, distributors, and consumers.



●Their practices and strategies wield significant influence over food losses and waste generation at both the early and later stages of the food supply chain.



●Imposed quality standards for products often result in the rejection of certain items, leading to losses in prior stages, such as processing.



●Marketing tactics employed by traders often encourage unsustainable purchasing behaviors among customers. Promotions like buy-one-get-one-free, second item for a cent, various discounts, and even aroma marketing motivate consumers to purchase more food than necessary, resulting in food waste at home.



●Many products recalled from retail remain fit for human consumption. In numerous cases, such items can be utilized for charitable purposes, thereby reducing food waste.

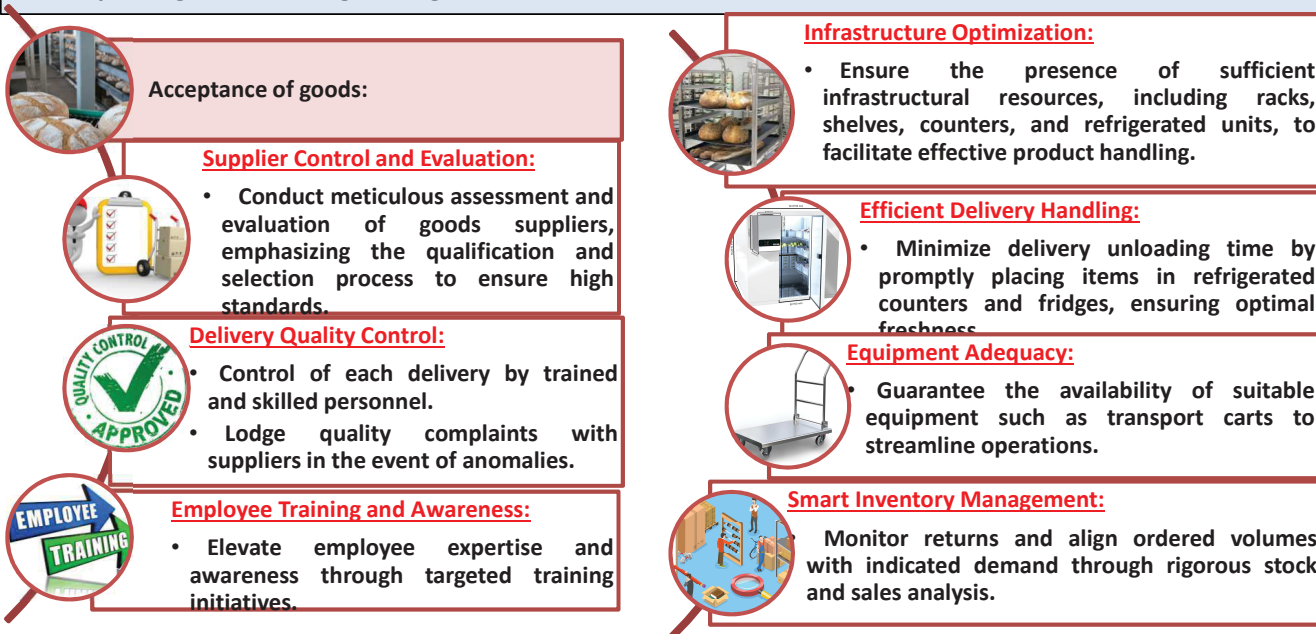


●The reverse flow of bakery and confectionery products from retail to bakeries, where these products are disposed of and incurred costs are borne by bakeries, creates a lack of incentive for retailers to reduce this flow. Although the losses originate at the retail stage, they are documented, processed, and financially managed at the production level.



## Recommendations for the merchandising chain

To enhance retail operations while minimizing wastage, a comprehensive approach can be undertaken, encompassing the following strategies:





## Storage:

### Storage Conditions and Equipment Oversight:



Monitor and regulate storage conditions, including temperature and humidity, while also ensuring effective control of cooling systems.

- Regularly inspect and maintain equipment to ensure optimal

### Safeguarding Goods and Storage Rooms:



• Establish power generators or alternative protection methods, especially for refrigerated goods, to prevent spoilage.

• Apply preventive measures like disinfection and pest control to shield storage rooms from potential pest infestations.

### Efficient Product Handling:



- Adhere to the "first in, first out" (FIFO) principle to ensure proper product rotation and usage.

### Infrastructure Optimization:



- Ensure the presence of sufficient infrastructural resources, including racks, shelves, counters, and refrigerated units, to facilitate effective product handling.

### Efficient Delivery Handling:



- Minimize delivery unloading time by promptly placing items in refrigerated counters and fridges, ensuring optimal freshness.

### Equipment Adequacy:



Guarantee the availability of suitable equipment such as transport carts to streamline operations.

### Smart Inventory Management:



- Monitor returns and align ordered volumes with indicated demand through rigorous stock and sales analysis.



## Storage:



### Employee Training and Awareness:

- Provide comprehensive training to employees, raising their skills and awareness of waste reduction practices.



### Employee Well-being:

- Implement regular medical examinations for employees to ensure their health and safety.



### Hygiene and Personal Protection:

- Furnish employees with adequate facilities for hand washing, disinfection, and personal protective gear like nitrile rubber gloves and hairnets.



## Display / shopping area



### Monitoring Display Conditions:

- Ensure precise temperature and humidity control within appliances and shopping areas.
- Implement rigorous cooling system supervision.



### Equipment Oversight:

- Regularly inspect and perform maintenance activities on equipment to ensure optimal functionality.



### Ensuring Goods Protection:

- Establish power generators or alternative safeguards, especially for perishable goods that require refrigeration.



### Pest Protection:

- Enforce preventive measures to guard against pests, involving disinfection, pest control, and rodent management.



### Effective Display Practices:

- Adhere to the "always forward" principle to ensure accurate and appealing product presentation.



### Employee Training and Awareness:

- Provide comprehensive training to employees to enhance their skills and raise awareness.



### Infrastructure and Equipment Management:

- Maintain vigilance over the integrity of infrastructure and control/measuring equipment.



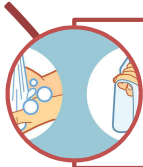
### Employee Well-being:

- Conduct regular medical examinations for employees to safeguard their health.



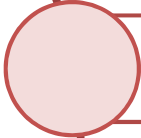


## Display / shopping area



### • Employee Hygiene and Protection:

- Equip employees with facilities for hand washing, disinfection, and personal protective gear such as nitrile rubber gloves and hairnets.



- Customer Safety: Extend personal protective equipment to customers to ensure their safety.



- Effective Packaging: Ensure products available to customers are provided with appropriate packaging, including proper unit packaging within stores.



- Managing Product Expiry: Implement stringent control over use-by dates and apply discounts ahead of product expiry.



- Discount Strategies: Introduce discounts for bread and other bakery and confectionery products.



- Promotion and Education: Initiate promotional and educational initiatives to apprise customers of the potential to repurpose older bakery and confectionery products, thus fostering a reduction in wasted food.



- Substantial Discounts for Damaged Goods: Offer significant price reductions for products with minor damages.



- Regular Returns and Repurposing: Arrange for daily returns of goods to suppliers for repurposing as fodder or biomass.



- Redistribution for Social Welfare: Redistribute unsold yet uncompromised goods nearing their expiry date for social welfare purposes.



By methodically addressing each of these measures, retail establishments can not only minimize waste but also promote responsible consumption and contribute positively to both their communities and the environment.



Customer education is also very important, mainly to promote proper storage, planning of food purchases and consumption.



The extent of food waste and the challenges of waste management at the household level can differ based on the geographical location or the socioeconomic standing of the consumer.



Existing literature identifies potential factors behind this occurrence, including irrational shopping choices and careless handling of food while cooking and storing. (EUFIC, 2021)

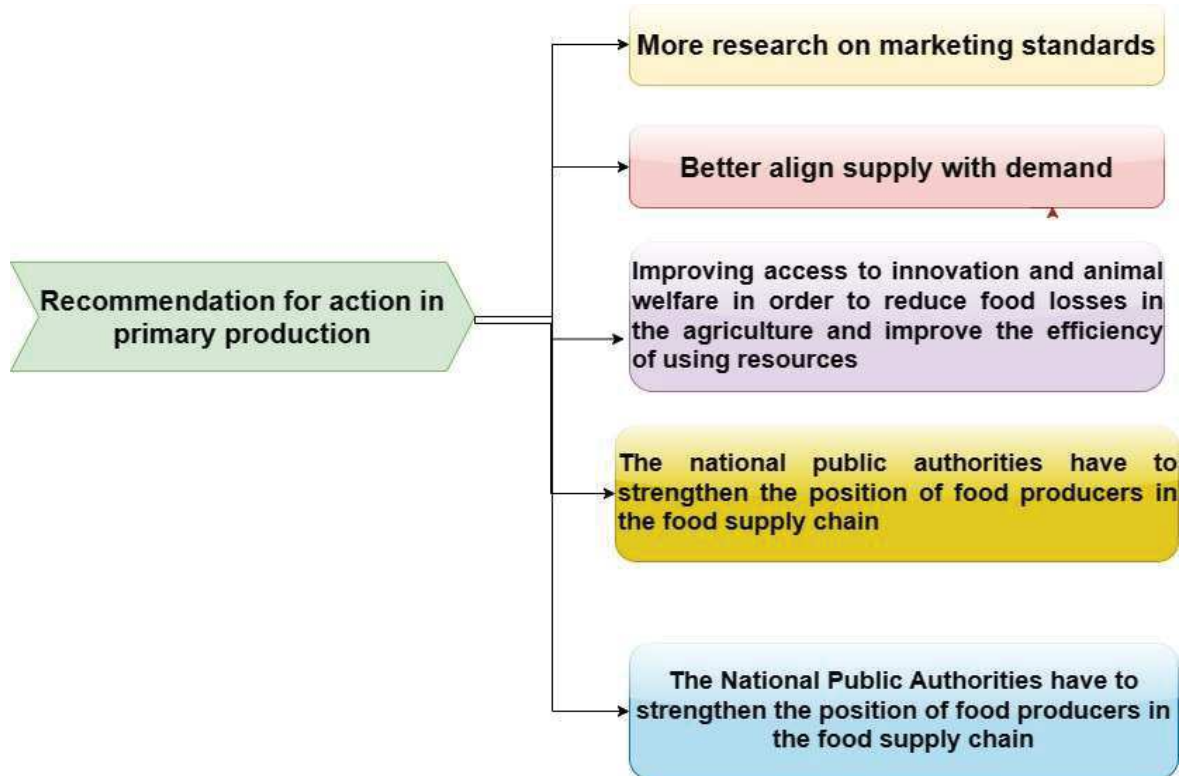


## Recommendations for action in food waste prevention - Developed by the EU Platform on Food Losses and Food Waste

### National public authorities in cooperation with civil society actors

-  **Elaborating national strategies for preventing and reducing food loss and waste, that comply with the Sustainable Development Goal**
-  **The food policies should integrate food loss and waste reduction**
-  **The climate action strategies should integrate food loss and waste reduction**
-  **Include food loss and waste prevention in the actions taken in the food supply chain**
-  **Address and fill the data gaps: improve availability and quality of data on food loss and waste levels and related impacts at social, economic and environmental level**

-  **Improved monitoring, evaluation and knowledge sharing on food waste prevention**
-  **Integrate in public and private sectors at the professional training level the education regarding food loss and waste prevention**
-  **Better awareness of the consumers in order to understand that wasting food should no longer be acceptable**
-  **Better visibility of the actions taken for food waste prevention**
-  **Promoting new market opportunities, the circularity and increase the innovation capacity**
-  **Better financial support for the players involved in food loss and waste reduction (focus on SMEs, farmers)**





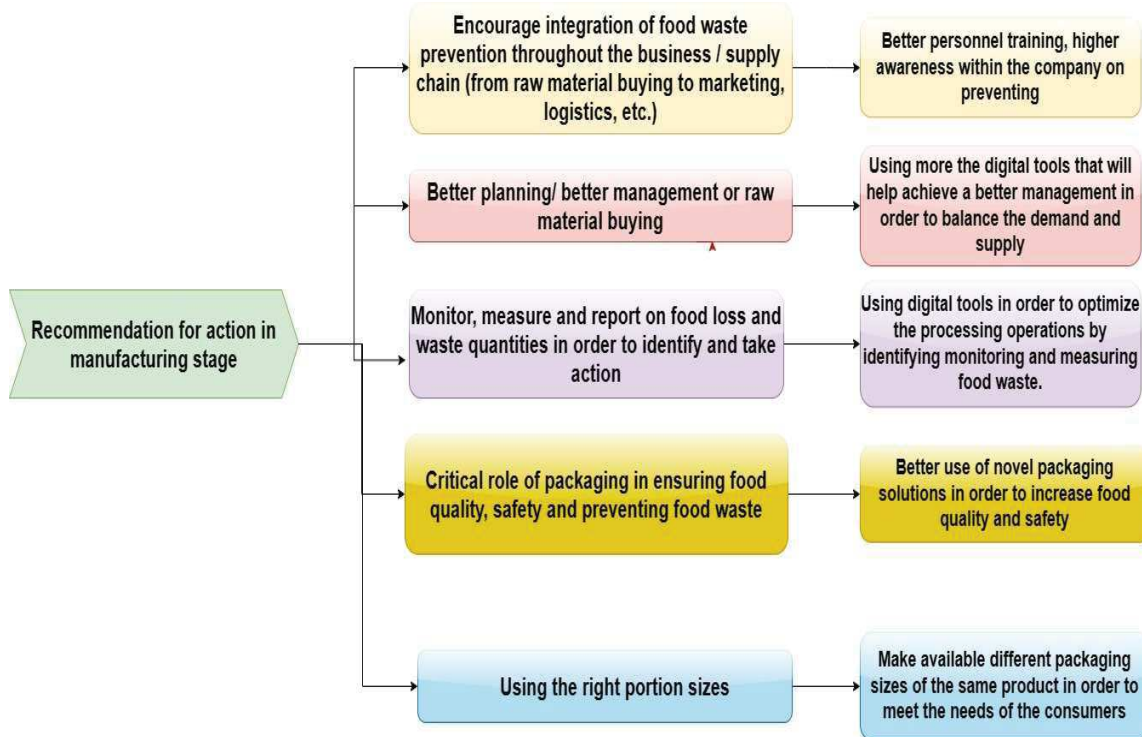
## Recommendations for action at manufacturing stage

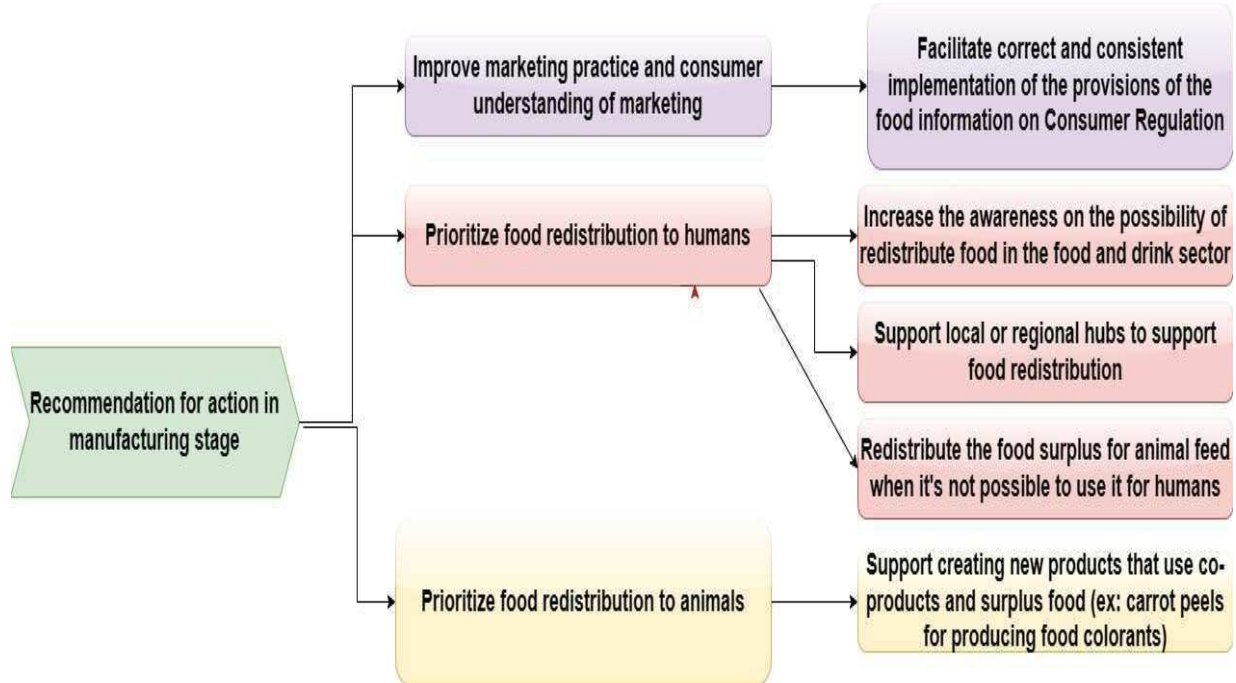
According to the latest estimates, around 19% of the total food waste generated in the EU comes from the processing sector

Food waste prevention is a key priority for food and drink manufacturers, and many companies make it part of their internal environmental management system and overall sustainability strategy.

For manufacturers, tackling food waste entails a close collaboration with other stages of the food supply chain, both upstream and downstream.

While the primary focus for manufacturers is to drive out inefficiencies within supply chains and prevent food waste from occurring in the first place;  
Where surpluses cannot be avoided, redirecting food to people should be a first consideration in accordance with the waste prevention hierarchy.









## Recommendations for action at retail stage

The latest figures indicate that approximately 5% of the total amount of food waste in the EU is generated in the wholesale and retail sector (around 5 million tonnes)

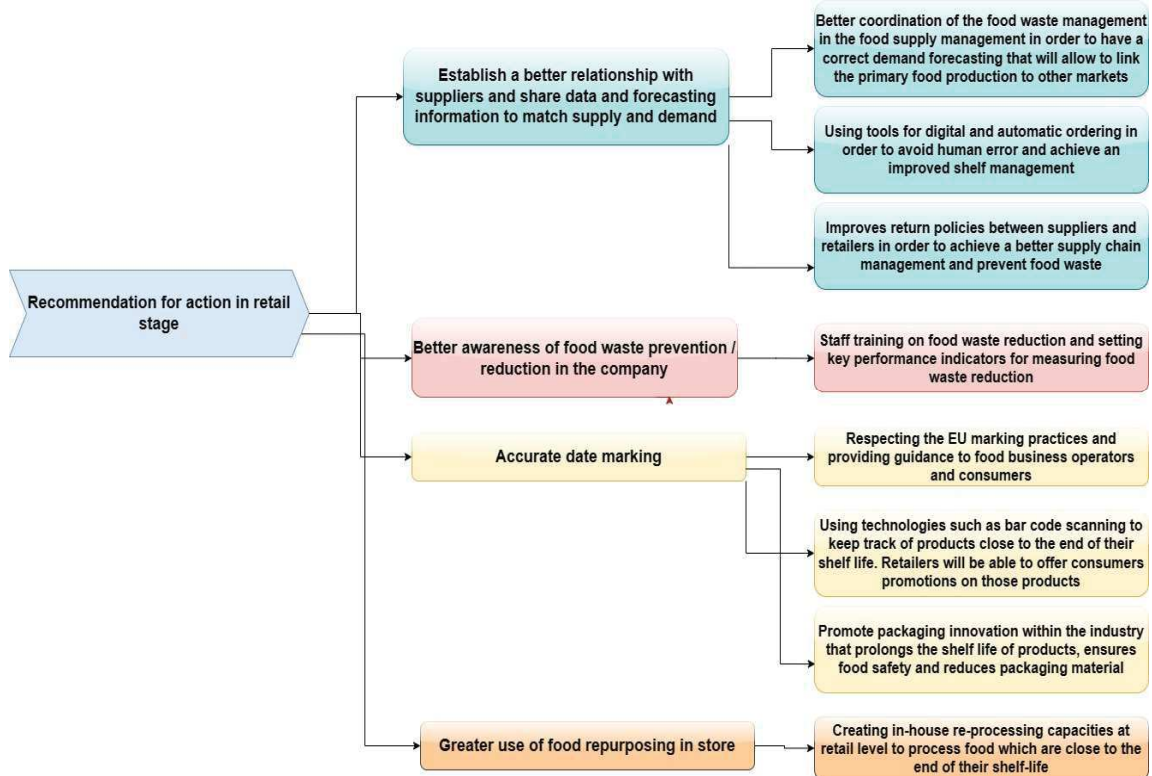
The cost for food waste and price discounts for European retail is estimated at 13 billion Euro, corresponding to 1,64% of total sales.

Retailers and wholesalers have a pivotal role to play in contributing to the reduction of food waste along the supply chain. Taking action often involves collaboration with food business operators from other stages (primary production, manufacturing) and providing enabling conditions to reduce food waste.

The causes of food waste are varied, such as changes in seasonal supply or knowledge of the precise level of consumer demand, inappropriate sizes or packaging compared to the type of households, esthetical considerations for fresh produce or lack of consumer understanding concerning the difference between "best before" and "use by" date markings.

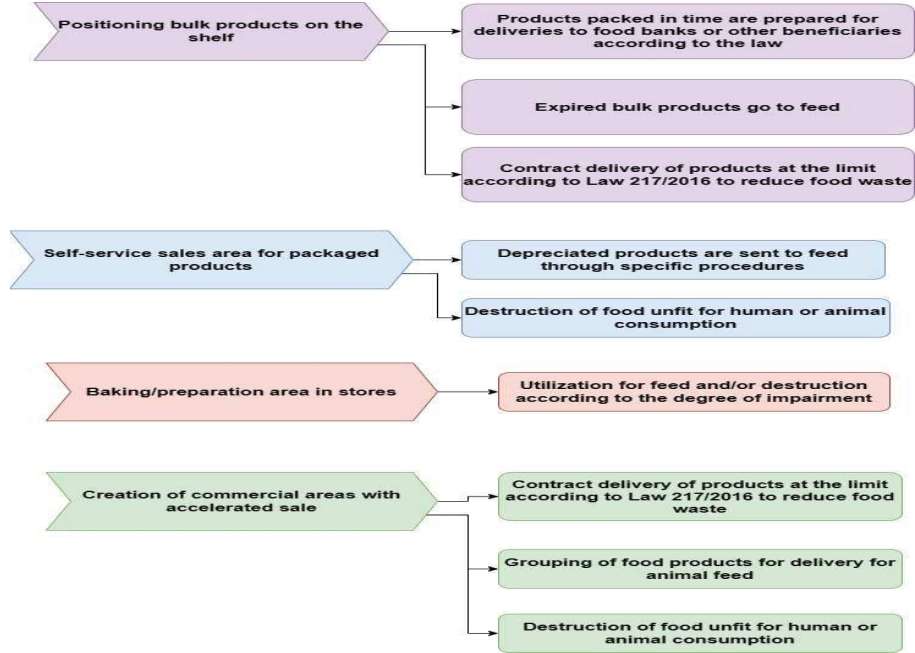
The retail sector often drives sustainability issues through voluntary action at company or more global level, such as the 2012 Retail Agreement on Waste and the Food Waste Resolution of the Consumer Goods Forum, under which leading food companies and retailers have pledged to halve an amount of food wasted within their operations by 2025.







## RECOMMENDATIONS FOR THE SALE AREA





1. Aiello, G., Enea, M., & Muriana, C. (2014). Economic benefits from food recovery at the retail stage: An application to Italian food chains. *Waste Management*, 34 (7), 1306–1316
2. Aljohani, K. Optimizing the Distribution Network of a Bakery Facility: A Reduced Travelled Distance and Food-Waste Minimization Perspective. *Sustainability* 2023, 15, 3654. <https://doi.org/10.3390/su15043654>.
3. Arabshaybani, A.; Arshadi Khamesh, A. Robust and resilient supply chain network design considering risks in food industry in Iran. *Int. J. Manag. Sci. Eng. Manag.* 2021, 16, 197–208.
4. Bhardwaj A., Rachit Soni R., Pal Singh L., S Mor R., 2022, A Simulation Approach for Waste Reduction in the Bread Supply Chain. *Logistics* 2023, 7, 2. <https://doi.org/10.3390/logistics7010002>
5. Bierma, Thomas J., Guang Jin, Bazan, Christy N. (2019) Food Donation and Food Safety: Challenges, Current Practices, and the Road Ahead. *Journal of Environmental Health*. Jun2019, Vol. 81 Issue 10, 16-21
6. Brancoli, P., 2021. Prevention and valorisation of surplus bread at the supplier–retailer interface. *DiVA portal*, Volume 124.
7. Brancoli, P., Lundin, M., Bolton, K. & Eriksson, M., 2019. Bread loss rates at the supplier-retailer interface: Analysis of risk factors to support waste prevention measures. *Resources, Conservation & Recycling*, Volume 147, pp. 128–136
8. Broekmeulen, R.A.; van Donselaar, K.H. Managing Retail Food Waste & Markdowns—Increasing Sales and Reducing Waste in the Fresh Supply Chain; ECR Retail Loss Group: Brussels, Belgium, 2016.
9. Christoph Teller, Christina Holweg, Gerald Reiner, Herbert Kutzab, Retail store operations and food waste, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro
10. Cicatiello, C., Franco, S., Pancino, B., Blasi, E., & Falasconi, L. (2017). The dark side of retail food waste: Evidences from in-store data. *Resources, Conservation and Recycling*, 125, 273–281.
11. Cicatiello, C.; Franco, S.; Pancino, B.; Blasi, E. The value of food waste: An exploratory study on retailing. *J. Retail. Consum. Serv.* 2016, 30, 96–104
12. de Moraes CC, de Oliveira Costa FláHenrique, Roberta Pereira C, da Silva AL, Delai I, Retail food waste: Mapping causes and reduction practices, *Journal of Cleaner Production* (2020), doi: <https://doi.org/10.1016/j.jclepro.2020.120124>
13. EUFIC. 2021. Retrieved from: <http://www.eufi.c.org/article/pl/artid/ How-to-minimise-food-waste>
14. FAO. Global Food Losses and Food Waste—Extent, Causes and Prevention; Food and Agriculture Organization of the United Nations: Rome, Italy, 2011
15. FAO. The State of Food Security and Nutrition in the World: Safeguarding against Economic Slowdowns and Downturns; State of the World; Food and Agriculture Organization of the United Nations: Rome, Italy, 2019
16. Federica Chelli, Debora Battaglia, Rossella Gallo, Vittorio Dell'Orto. EU legislation on cereal safety: An update with a focus on mycotoxins, *Food Control*, 37 (2014), 315–325.
17. Ghosh, R.; Eriksson, M. Food waste due to retail power in supply chains: Evidence from Sweden. *Glob. Food Secur.* 2019, 20, 1–8.
18. Glatzel, C.; Großpietsch, J.; Hübner, A. Higher margins through efficient supply chains. *Akzente* 2012, 2, 16–21. 9.
19. Gorynska-Goldmann E., Gazdecki M., Rejman K., Laba S., Kobus-Cisowska J., Szczepanski K., 2021, Magnitude, Causes and Scope for Reducing Food Losses in the Baking and Confectionery Industry—AMulti-Method Approach. *Agriculture* 2021, 11, 936. <https://doi.org/10.3390/agriculture11100936>
20. Gruber, V., Holweg, C., & Teller, C. (2016). 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.
21. Harish K. Jeswani\*, Gonzalo Figueroa-Torres, Adisa Azapagic, The extent of food waste generation in the UK and its environmental impacts, *Sustainable Production and Consumption* 26 (2021) 532–547.
22. <https://doi.org/10.1016/j.foodcont.2013.09.059>.
23. Hübner, A.; Schäfer, F.; Schaal, K. Maximizing Profit via Assortment and Shelf-Space Optimization for Two-Dimensional Shelves. *Prod. Oper. Manag.* 2020, 37, 765
24. Iakovleva Maryna (2021) Food waste in bakeries- quantities, causes and treatment, Swedish University of Agricultural Sciences, SLU Sustainable Food Systems, Molecular Sciences, 2021:32, Uppsala.
25. Indrachapa D. Balasooriya, Food losses and Waste at Bakeries, Retail and Household Levels-A Case of Sweden, Swedish University of Agricultural Sciences, SLU Faculty of Natural Resources/Department of Molecular Sciences Sustainable Food Systems Molecular Sciences, 2022:47 Uppsala, 2022
26. Ishangulyyev, R.; Kim, S.; Lee, S.H. Understanding food loss and waste—Why are we losing and wasting food? *Foods* 2019, 8, 297.
27. Jianrong Zhang, Tejas Bhatt, 2014 A Guidance Document on the Best Practices in Food Traceability Comprehensive Reviews in Food Science and Food Safety Volume 13, Issue 5, 771–1123
28. Klingler, R.; Hübner, A.; Kempcke, T. End-to-End Supply Chain Management in Grocery Retailing; European Retail Institute: Köln, Germany, 2016. 8.
29. Mena, C.; Adenso-Diaz, B.; Yurt, O. The causes of food waste in the supplier–retailer interface: Evidences from the UK and Spain. *Resour. Conserv. Recycl.* 2011, 55, 648–658
30. Paola Garrone, Marco Melacini, Alessandro Perego, Sedef Sert (2016) Reducing food waste in food manufacturing companies. *Journal of Cleaner Production* 137 (2016), 1076–1085. <https://doi.org/10.1016/j.jclepro.2016.07.145>
31. Purabi R. Ghosh,1 Derek Fawcett,1 Shashi B. Sharma,2 and Gerrard Eddy Jai Poinern1 1Murdoch Applied Nanotechnology Research Group, Department of Physics, Energy Studies and Nanotechnology, School of Engineering and Energy, Murdoch University, Murdoch, WA 6150, Australia; 2Department of Agriculture and Food, 3 Baron-Hay Court, South Perth, WA 6151, Australia - Progress towards Sustainable Utilisation and Management of Food Wastes in the Global Economy
32. Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32002R0178>
33. Riesenegger, L.; Hübner, A. Reducing Food Waste at Retail Stores—An Explorative Study. *Sustainability* 2022, 14, 2494. <https://doi.org/10.3390/su14052494>
34. Riesenegger, L.; Hübner, A. Reducing Food Waste at Retail Stores—An Explorative Study. *Sustainability* 2022, 14, 2494. <https://doi.org/10.3390/su14052494>
35. Schneider, F. (2013) The evolution of food donation with respect to waste prevention. *Waste Management Vol. 33*, Issue 3, March 2013, Pages 755–763
36. Stenmarck Åsa, Carl Jensen, Tom Quested, Graham Moates. 2016. Estimates of European food waste levels. Stockholm: EU-FUSIONS, <https://www.eu-fusions.org/phocadownload/Publications/Estimates%20of%20European%20food%20waste%20levels.pdf>
37. Teller, C.; Holweg, C.; Reiner, G.; Kutzab, H. Retail store operations and food waste. *J. Clean. Prod.* 2018, 185, 981–99
38. Wojciechowska-Solis, J., & Smiglak-Krajewska, M. (2020). Consumer education and food waste: an example of the bakery market - the case of young consumer. *European Research Studies Journal*, 23(Special issue 1), 89–96.
39. Yadav, V.S.; Singh, A.; Raut, R.D.; Cheikhrouhou, N. Design of multi-objective sustainable food distribution network in the Indian context with multiple delivery channels. *Comput. Ind. Eng.* 2021, 160, 107549.
40. \*\*\* <https://frogmi.com/en/blog/5-initiatives-for-retailers-to-reduce-food-waste>;
41. \*\*\* <https://linkretail.com/5-retail-food-waste-management-strategies/>
42. \*\*\* <https://ohioline.osu.edu/factsheet/fabe-6611>;
43. \*\*\* <https://www.fao.org/sustainable-development-goals/indicators/1231/en/>
44. \*\*\* <https://www.mdpi.com/2311-5637/4/1/9#>