AlixPartners

CentraleSupélec

CentraleSupélec & AlixPartners:
Food waste - grocery retailers and households

July 2021

Agenda

- **Executive summary**
- Introduction and context
- Shrinkage of grocery retailers
- Households shrinkage
- Conclusion

Executive summary

Food waste and shrinkage account for more than

US $1 TRILLION OF LOSS PER YEAR

and 8% of greenhouse emission.

For clarity, 'food waste' defines waste after being sold from stores, while 'shrinkage' accounts for waste accrued in stores and the downstream value chain.

The hypothetical root causes of high shrinkage for products with relative good revenue performance were:

- Quantity of implantation and sales forecast. Data demonstrated that incorrect data relating to quantities for implantation in stores could apply to 20% to 25% of products.
- A cause-effect link can be established for supermarkets with increased shrinkage when quantities are overestimated, while hypermarkets' incorrect implantation does not increase shrinkage.

In stores, the shrinkage root causes revealed were:

HIGH PRICING

INCORRECT SALES FORECASTS

DELIVERY DELAYS

LACK OF HUMAN AND MATERIAL RESOURCES

Executive summary (cont'd)

- **Errors in sales forecasts** appear to be the main cause of shrinkage at store and product level — the higher the forecast errors, the higher the shrinkage level.
- **Retailers need to improve their accuracy of predictions** when considering seasonality and temporality criteria. Classic predictive analysis is not sufficient anymore; more complex models must be implemented to include multiple data sources and real-time adjustments.
- **Customer insight is key to success**. Our survey shows that most customers don't waste, while some waste once a week or more. Product categories are not equally spread between wasted products: fruit, vegetables and bread are most impacted vs. meat/fish and dairy products.
  Reasons for waste differ between products but the most common are: expiry date, packaging size, aesthetics of products.

We suggest different customer profiling by **age, income, number of people** to analyse waste root causes and offer personalized solutions.

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AlixPartners

Size and scope

- Global business advisory
- 25 global offices
- 60+ languages

Clients

- Corporate Boards and Management
- Law firms
- Investment banks
- Investors

Business model

- Low leveraged model of small teams
- Aligned incentives with performance
- Managing Directors average 25+ years of industry experience
- Directors average 15+ years of industry experience

History

- Founded in 1981
- Pioneered approach to Turnaround & Restructuring

CentraleSupélec

World Rank	Institution	Country/Region
1	Paris-Saclay University	
2	Princeton University	
3	Sorbonne University	
4	University of Cambridge	
5	University of Oxford	

- An Engineering University founded in 1829
- Global leadership in **mathematics**

RESEARCH METHODOLOGY

This study, in collaboration between AlixPartners and CentraleSupélec, focused on the downstream value chain using retailer and customer data to identify shrinkage root causes and provide potential recommendations.

Shrinkage analysis has been completed at category and store levels. Each category has an average grading against three criteria: shrinkage, sales, and profitability in order to identify those underperforming.

A dedicated team composed of Students, Professors and Consultants to perform analysis and recommendations

AlixPartners

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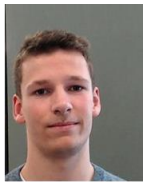


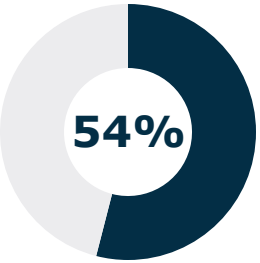
Paul NOIRET
Student

Across the entire food value-chain, efficiency is not only weak, it is a disaster

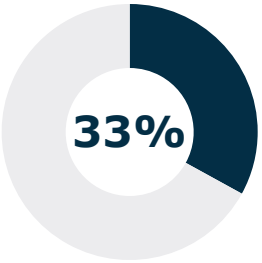
33%
of food is waste versus 67% is consumed worldwide

$1 trillion
of waste and shrinkage lost per year

8%
of greenhouse gas emission comes from food waste

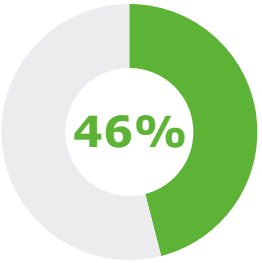


Of production is lost globally



Is lost post-harvest and storage levels

AREA OF FOCUS FOR THIS STUDY



Is lost at Process-Distribution-Consumption levels

Retail

- Links between sales forecasts and shrinkage, local market specificities.
- Point-of-sale specificities, scheduling, resources and shelf constraints.

Consumers

- Behaviour in terms of expiry dates
- Impact of promotions
- Packaging size

Source: United Nations analysis and figures – US government figures

A world in flux, and a kind of consensus between tenors – from opposite horizons

"Costs linked with a stand-by-and-watch attitude on climate is evaluated at US$20 to 25 trillion per year – around ¼ of global revenue – not good news for investment"

HUBERT KELLER, MANAGING DIRECTOR

"I believe that the pandemic has presented such an existential crisis – such a stark reminder of our fragility – that it has driven us to confront the global threat of climate change more forcefully and to consider how, like the pandemic, it will alter our lives."

LARRY FINK, CEO

"Let's be clear. We don't need a 'low carbon economy.' We don't need to 'lower emissions.' Our emissions have to stop if we are to have a chance to stay below the 1.5-degree target. And, until we have the technologies that at scale can put our emissions to minus, then we must forget about net zero. We need real zero."

GRETA THUNBERG, ACTIVIST

Given the in-store shrinkage and household waste findings, what specific levers could be put in place?

STUDY OF SHRINKAGE BY PRODUCT

- Shrinkage figures
- Highlight problematic products
- Cross analysis of profitability, sales & shrinkage

STUDY OF SHRINKAGE BY STORE

- Lack of adaptation in product offering
- Incorrect sales forecasts?
- Mismanagement of point of sale?
  - How to explain the different shrinkage level between stores?

Key steps

HOUSEHOLD WASTE

- Study of household consumption habits
- Link with respective behaviours regarding waste
- Comparison of different customer profiles

TAILORED SOLUTIONS

- General solutions not enough: need to find more efficient levers to implement
- Need for tailored solutions according to customers' profiles
- Study of household waste determined multiple personae

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How do we spot problematic products in-store?

Focus on controlled shrinkage of grocery retailers:
products that are thrown away because they are not sold (not theft).

Analyze shrinkage per category by increasingly precise categories:
by section, by family of product, by article and trends observation.

Grades allocated against three criteria:
sales, profitability and shrinkage.

Section	Sales (€)	Margin (€)	Waste (€)	Waste
Meat	10301840	1342936	397039	3.9%
Cold meats	26809538	4832784	586252	2.2%
Fruits	36786328	7886789	1316604	3.6%
Bread	9358001	4327168	341807	3.7%
Fish	4481069	805867	97003	2.2%
Prepared meals	10888906	3751285	303725	2.8%

Focus on transformed fresh products

Identification of sectors then problematic products, based on the calculated grades for each of them

Waste reduction solutions should be adapted to identified products

Removing the underperforming product is not always an option

- A product generating shrinkage could also be a best-seller product or an attractive product for the store.
- Deeper analysis should be completed to highlight shrinkage root causes, given its attractiveness to customers.

However legitimacy of the product in store should be analyzed

- Some products do not sell, are generating low margin and have a high level of shrinkage.
- For example, rare products that are not highly demanded: the balance between the few sales generated by customers vs. the financial losses caused by shrinkage should be measured.

What are the root causes of shrinkage for products obtaining an average grade? (good sellers)

- Inaccurate sales forecasts or bad quantity of implantation.
- Poor adaptation of product offerings to different market changes: seasonal changes, customer demographic shifts etc.

What are the potential savings by learning to control shrinkage?

- It depends on the type of products and solutions considered.
- It depends on the type of stores (hypermarkets, supermarkets, convenience, etc.) and location.
- Solutions found and associated savings should compensate the declining profit attributed to a more responsible attitude from customers.

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The impact of implantation quantity on shrinkage levels

- **Quantity of implantation =** quantity of a product that store should always have available (on shelves or in stock).
- In theory, those implantation quantities are made to avoid out-of-stock issues. In reality, if incorrectly calculated, the quantity of implantation could lead to high level of shrinkage.
- From our study, we identified that for hypermarkets, approximately 22.5% of products would have an incorrect quantity of implantation. For supermarkets, this number is higher at 25.1%.

Hypermarket shrinkage

It appears that incorrectly estimating implantation quantity does not cause higher levels of shrinkage, and does not appear to be a root cause for shrinkage in hypermarkets. The global average percentage of shrinkage is 8.6% vs. 8.5% for products with overestimated implantation quantities.

Supermarket shrinkage

In supermarkets, when the quantity of implantation is overestimated, the shrinkage percentage is much higher than when it's underestimated: 17.5% vs. 11.3%.

Understanding the impact of sales forecasts on shrinkage

- If the forecast error is **greater than 0**, then sales have been overestimated and there is a risk of wasting.
- If the forecast error is **negative**, sales have been underestimated and there is a potential out-of-stock risk.

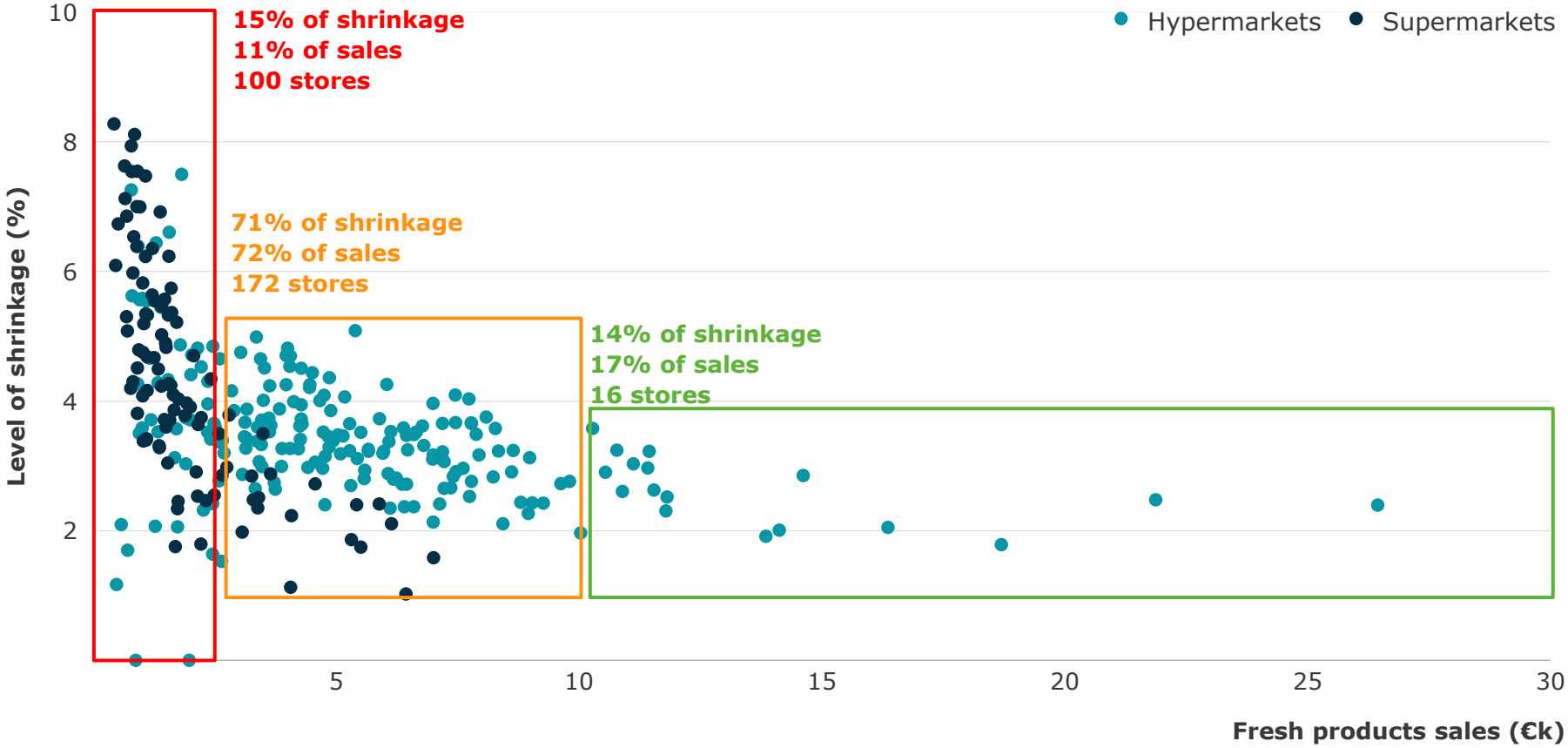
	Supermarkets	Hypermarkets
FORECAST LEADING TO WASTING RISK	17.6 %	12.2%
ACCURATE FORECAST	7.1%	5.4%
FORECAST LEADING TO AN OUT-OF-STOCK ISSUE	3.9%	3.7%

There is a positive relationship between forecasting errors and shrinkage. The higher the forecast error is, the more waste is generated.

When forecasts are underestimated, the shrinkage percentage is very low and can lead to potential sales loss for the stores because of out-of-stock issues.

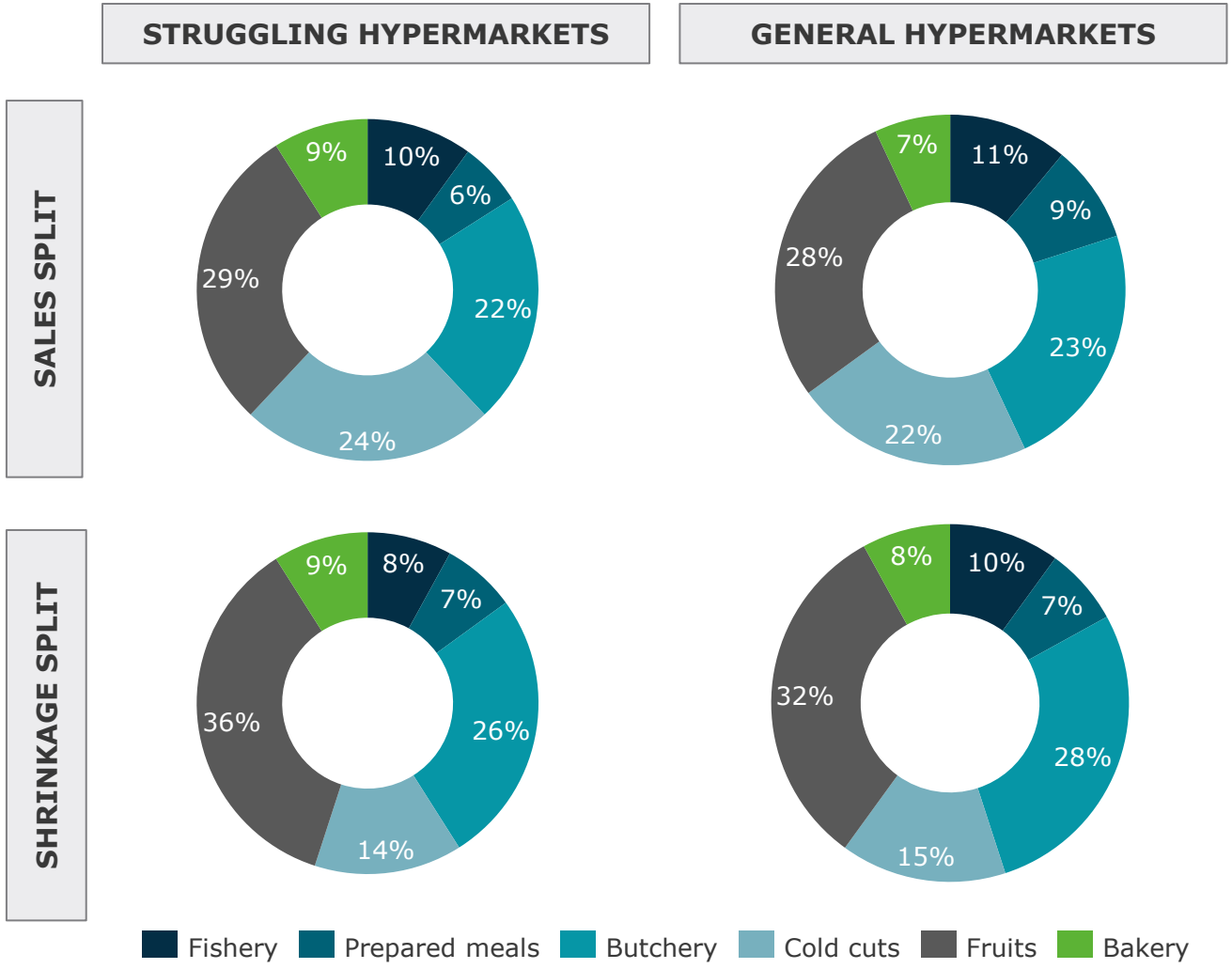
Three categories of hypermarkets can be defined, according to level of sales and shrinkage

SALES AND SHRINKAGE PERCENTAGE PER STORE



Improvement opportunities	Low improvement opportunities: mid-size format (€210k - €1m)	Large hypermarkets (+ €1m): performing well, low shrinkage vs. sales

Shrinkage levels by category differ between normal hypermarkets and problematic hypermarkets



Problematic hypermarkets are defined as those with a shrinkage level of 5% and more

COLD CUTS: good performance overall.

BUTCHERY: percentage of shrinkage highly problematic (not taking into account struggling hypermarkets).

FRUITS AND VEGETABLES: struggling hypermarkets are selling more fruits and vegetables and wasting twice the average: predictive analysis tools overestimate this demand.

PREPARED MEALS: hypermarkets are selling fewer prepared meals; predictions have not adapted to decreasing consumption levels.

Aside from being an ecological disaster, there are serious economic consequences of shrinkage for all type of stores

- Shrinkage is an ecological aberration. But not only this…
- Shrinkage induces strong economic losses. For the purpose of this study, the hypermarkets we have looked at have a controlled shrinkage percentage of approximately 3% of turnover which represents more than €2.5 million per month. For supermarkets, shrinkage levels are at almost 3.4% of turnover, which represents more than €500,000 per month.
- **We have simulated the average monthly savings that could be realized by a grocery retailer per store if shrinkage was reduced by 10%:**

	Supermarkets	Hypermarkets
10% reduction in shrinkage	€516	€1,221

Extrapolating this for a whole year and taking data from all stores given in the database (more than 200 hypermarkets and 100 supermarkets):

Decreasing shrinkage by 10% could reduce losses by more than

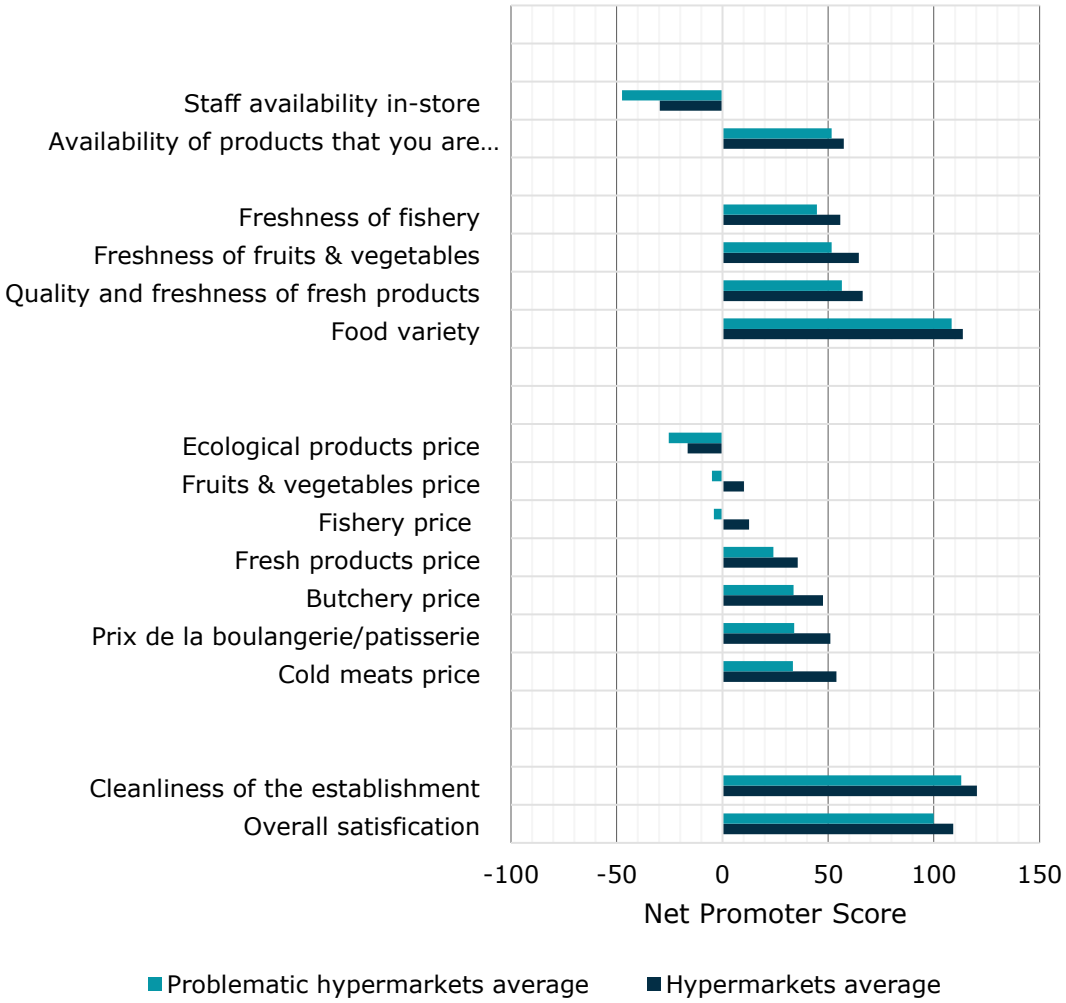
€3.6 million

Decreasing shrinkage by 40% could reduce losses by almost

€14.5 million

Human resources and pricing are key elements to take into consideration when looking at shrinkage level per store

NET PROMOTING SCORE COMPARISON: PROBLEMATIC HYPERMARKETS VS. AVERAGE



- Net Promoting Score (NPS) is a measurement of how likely customers will recommend a product or a service out of 10 points.
- A grade from 0 to 6 means a customer is a detractor.
- A grade of 9 or 10 means a customer is a promoter.
- NPS = % promoters - % detractors.
- February-March-April 2019, survey on 40,654 consumers, 207 stores, 199 surveyed per store on average.

KEY TAKEAWAYS

- **Low performing hypermarkets in terms of shrinkage are also the ones with lower than average NPS grade.**
- Prices are considered too high for fruits & vegetables, fish and organic products in particular. We can assume that price is a contributing factor to shrinkage.
- Breadth of product range is a strong element in all stores: this could undoubtedly be reduced for products with a strong impact on markdown.
- Perceived hygiene, material means: no obvious correlation.

Store shrinkage – potential levers to implement

High in-store shrinkage root causes hypothesis	Potential levers for improvement
• Delays in delivery resulting in already damaged products on arrival date in-store.	• Adjustments to replenishment defined at store level, taking into account characteristics and constraints.
• Fruits & vegetables prices considered too high.	• Fruits & vegetables: better negotiation with suppliers on price, PCB and packaging.
• Lack of material: refrigerator failures, stores and warehouse issues with air conditioning.	
• Human resources issues: lack of training, unsuitable technical ability, lack of time leading to precipitated actions and damaged products.	• Training: product handling and stock rotation, investment in technologies to quickly adjust with real-time data.
• Lack of precision of sales forecasts and implantation quantities.	• Set replenishment and command settings according to seasonality and temporality (seasons, events, tourism impact, etc.), consumption preferences and external data considerations (weather forecasts, events).
• Merchandising strategy not adapted.	• Leverage new technologies, artificial intelligence to improve predictive analysis and adapt merchandising
• Misalignment between customers' preferences and stores' product offering.	• Knowing your customer is key; defining customer profiles to adjust offerings for each group.
• Customers attitude and maturity towards waste.	• Involve client in seeking alternative solutions: differentiate price for products close to expiry date, in-store products transformation, recipe ideas, etc.

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  - **Study introduction & results**
  - Personae: customers profile
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To understand the root causes of food waste, we need to look at their consumption habits

Study

- Study of household consumption habits.
- Study of household behaviours in terms of food waste.
- Validation of hypothesis of food waste root cause.

Organization

- Survey conducted by Potloc on social media.
- Objective: establish links between consumer profiles, their habits and associated waste.

Sample

- Three countries: United Kingdom, France, Italy.
- 1,500 respondents: 75% women, 25% men .
- Diverse profiles in terms of income, social situation, age, family type.

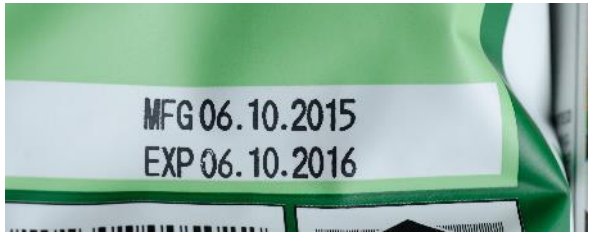
Personae

- Determination of profiles.
- Analysis of each profile and their characteristics in terms of waste.
- Proposal of solutions adapted to each profile.

We have formulated hypotheses on potential root cause of household waste before questioning them on those topics

Impulsive purchase on promotions or attractive packaging: To what extent do consumers waste more than usual when they buy a product unexpectedly?

Storage conditions: Is storage optimal?
Do consumers think of using options like freezer?

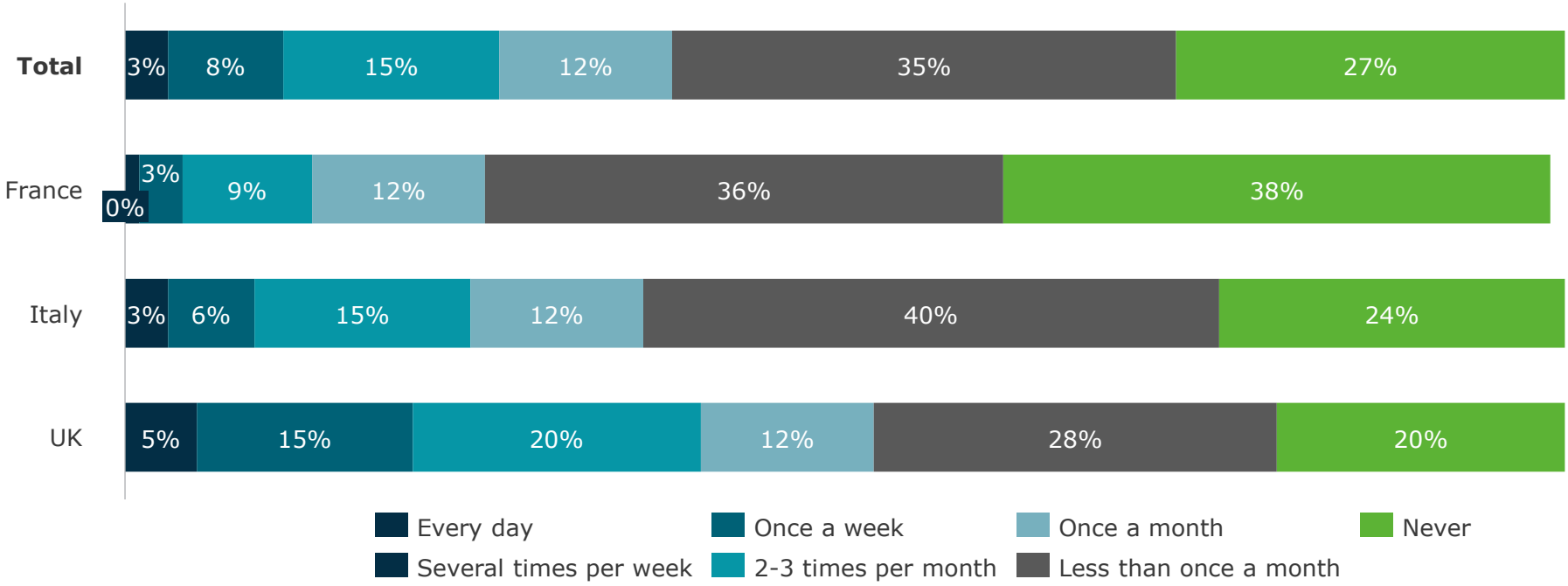


Best-before date too short: How much waste does the best-before date generate? Do consumers pay attention to this when in store? How ready are consumers to change their habits if the regulation does not change fast enough?

Attractiveness of products: Consumers are sensitive to the aesthetics of products, especially on fruits and vegetables? Are consumers aware of possible alternatives use that exist for damaged products?

Of those surveyed, French customers seem to be those who waste the least

Q: HOW OFTEN DO YOU WASTE FRESH PRODUCTS?



- Overall, most of the population do not waste (27%) or rarely (35%).
- Among all the surveyed population, the UK waste on average more than France.
- In the UK there is a high proportion of the population who waste several times per week (15%) or even every day (5%).

Waste is not equally distributed between product categories, and the reasons for wasting also vary

Fruits and vegetables

- 41% of respondents say they waste this category.
- The top reasons for waste are damaged products (56%) and purchase in too much quantity (29%).

Meat and fish

- 17% of respondents say they waste this category.
- The top reasons for waste are expiry date (57%) and purchase in too much quantity (21%).
- Only 6% said this has a link with promotional activity that they were attracted by.

Dairy products

- 14% of respondents say they waste this category.
- The prominent reason for wasting is the expiry date (75% of answers).

Bread

- 38% of respondents say they waste this category.

Consumer habits differ somewhat between countries

Expiry date

- 92% know they can consume products after the expiry date.
- While 70% of customers do not mind consuming a product after the expiry date, 5% reply they throw away automatically when the expiry date is overdue.
- 78% are willing to change, even without a change in the law.
- 30% of French customers organize their shopping (buy more frequently) so that they don't have to pay attention to expiry date.

Packaging

- 31% waste products at least once a month because of sizing issues.
- 58% assimilate packs with waste, but 88% buy "2 for one" promotions.
- Buying products in bulk is diversely split by country: seen more in the UK than in France.

Mobile app

- Only 21% of respondents use mobile apps for their grocery shopping.
- Most of them use TooGoodToGo which does not prevent household waste after purchase is made.

Product range

- It is very important to have a large product range in all countries: 72% in total say it is very important or important.
- However 63% of respondents say they never buy specific products such as gluten-free or lactose-free products.

Product aesthetics

- Aesthetics matter a lot: 76% in Italy and UK and 44% in France.
- However, French respondents are more tolerant than other countries with only 7% that would not buy a marked-down product (vs 15% and 9% in Italy and UK).
- Only 14% replied aesthetics is very important in France vs. 40% (IT) 34% (UK).

What general solutions can we propose in light of these observations?

1 Find alternatives to manage food after expiry date

- Implement new habits for bread or others: freeze, heat or toast it.
- Collect bread to give it to farmers and animal owners.
- Transform bread into flour, to make bread again – participating in circular economy.
- Transform the product to make the aesthetics dimension disappear: soup, jam, ice-cream, juice, etc.

2 Involve the entire cycle of production

- Test solutions on private label to demonstrate efficiency and extend to others.
- Brainstorm and negotiate with suppliers to offer better packaging possibilities.
- Make sure the solution is eco-friendly, keeping in mind not to increase the quantity of packaging.
- Retailers should set up more virtuous promotions for the consumer (product offered at a later date).

3 Increase level of customer information

- Demonstrate potential of savings that clients can do in avoiding waste.
- Enhance products from agricultural sectors, highlight the taste of the product, its authenticity, its quality.
- Develop applications helping consumers to reduce levels of waste (date monitoring and reminder, consumption advice).
- Increase communication on expiry date: inform on best practices per product type.

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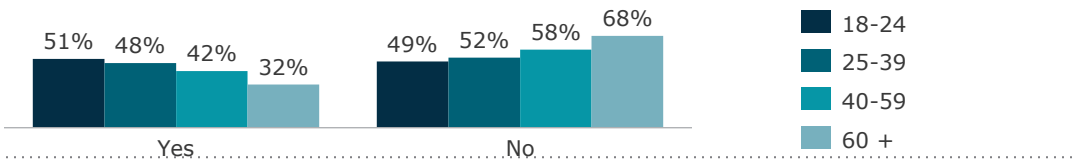
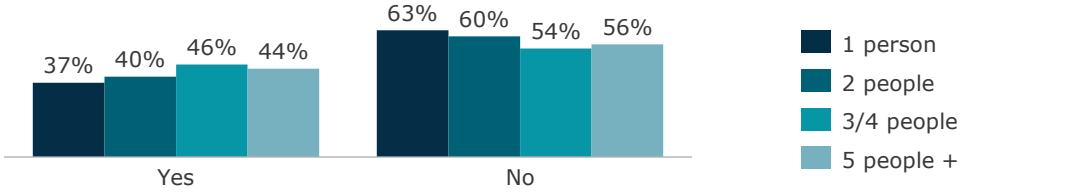
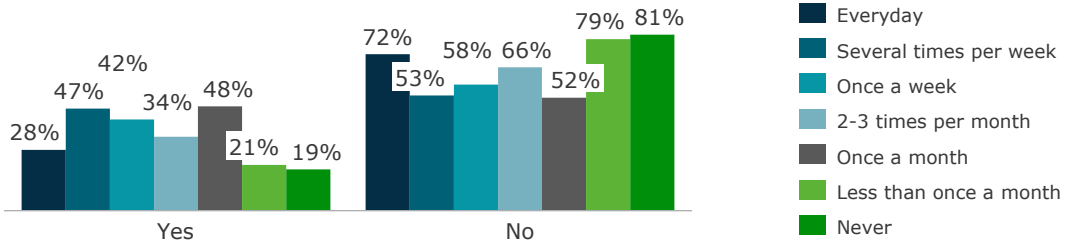
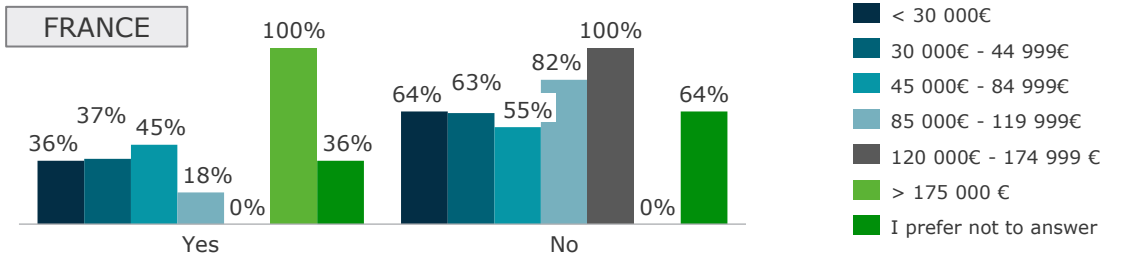
Solutions to fight waste in the long term need to be adapted to customers' profile characteristics

- **Purpose of personae:** establish typical consumer profiles to study their characteristics and find appropriate solutions for each of them.
- **Segmentation of the surveyed population:** the fruit and vegetable department is considered to be representative of other departments in terms of variation of trends between population categories.
- The significance of criteria in terms of variation will be retained to segment the population of respondents.

- Defined profile will then be further developed into Personae.
- Reasons for waste and waste in general can be looked at on a case-by-case basis, as can the solutions.

We need to review the criteria that drive a significant variation in levels of waste

Hypothetical criteria	Global results	Criteria selected
Waste of fruits and vegetables by age		**Yes**
Waste of fruit and vegetables by number of people in the household		**Yes**
Waste of fruit and vegetables by frequency of grocery shopping		**No**
Waste of fruit and vegetables by income level		**Yes**

Our survey highlights four profiles representative of the surveyed population

Student: 18 to 24 years old

LOW INCOME

Grocery shopping for 1

- Wasting a little bit more than average.
- Not targeted for unplanned grocery shopping on promotions.
- Tendency to buy too much food, more than average.
- Higher awareness of expiry date being problematic, ready to change consumption habits.
- Typical profile that uses mobile app to fight food waste.

Young adult: 25 to 39 years old (early career)

AVERAGE INCOME

Grocery shopping for 2

- Food waste in line with average waste of population.
- Expiry date appears more frequently as a reason of waste than other profiles.
- More likely to throw away non-opened products.
- Less mindful of expiry date before throwing products away.
- User of mobile app to fight against waste, however less than students.

Father/mother: 40 to 59 years old

AVERAGE INCOME

Grocery shopping for 5+

- Profile that wastes more than average.
- Example on fruits and vegetables: 59% say that they waste some vs. 41% on average.
- Better than average of grocery shopping planning.
- Less sensitive to expiry date issue.
- Dominating profile for in-store grocery shopping.

Older population: 60 years old and plus

AVERAGE INCOME

Grocery shopping for 2 (couple)

- Profile that wastes less than average.
- Good habits in terms of product stocking, products checking, etc.
- Tends to buy too much
- Less willing to change consumption habits, especially around expiry date issues.

In conclusion…

Student: 18 to 24 years old	Young adult: 25 to 39 years old (early career)	Father/mother: 40 to 59 years old	Older population: 60 years old and plus
LOW INCOME **Grocery shopping for 1**	**AVERAGE INCOME** **Grocery shopping for 2**	**AVERAGE INCOME** **Grocery shopping for 5+**	**AVERAGE INCOME** **Grocery shopping for 2** (couple)
The biggest generator of food waste: • Increase awareness from an early stage. • Take advantage of interest in new technology to offer mobile app to fight against waste.	Displays closer to average consumption behaviours: • Increase awareness to expiry dates. • Population sensitive to economical and ecological aspect of food waste.	A group without real specificity, which should however be impacted by general recommendations and those more specific to other personae.	The typical profile, much more sensitive to waste, which can be a source of inspiration for other consumers: • Reduce attachment to the aesthetics of products. • However, this group is less likely to change consumption habits > potentially due to lower adaptability than the other respondents in the survey.

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The key takeaways of this study

SHRINKAGE: ECOLOGICAL ASPECT

Huge environmental impact that we must reduce to avoid compromising the ability of future generations to meet their needs.

14% of wastage occurs during distribution

33% of wastage occurs during consumption

SHRINKAGE: ECONOMIC ASPECT

Whether for consumers or grocery retailers, waste brings significant economic losses, so it is in everyone's interest to reduce waste.

Key points

GROCERY RETAILERS' ROLE

- Improve stock management (implantation quantities and sales forecasting).
- Adapt management of stores at a more local level to quickly adjust if needed.
- Be proactive in offering customers alternatives to help reducing waste.

HOUSEHOLD ROLE

- Become aware
- Adopt the right actions in store and at home (expiry dates, aesthetics, etc.)
- Improve organization and management of grocery shopping.

The challenges of food waste are both economic and environmental. The pressure is growing, and all stakeholders must mobilize as quickly as possible to find solutions.

October 2020 – July 2021