Every centimetre counts - exploring non-functional slack-fill in packaging

Illustration: Packaging with non-functional slack-filling in products sold in The Netherlands Picture: Nina van Toulon

"Do you also wonder why your packaging isn't filled to the brim ?"

Let's take a closer look at functional and non-functional empty space in your packaging. This empty space is also called 'slack-fill'. In this article I explore non-functional slack-filling and the lack of policies and regulations to prevent non-functional wasteful use of materials.

In October 2021 I selected twenty products sold in a Dutch supermarket in packaging which seemed to be not full at first glance and feel. At home I took a closer look at brand name, brand-owner, product name, content quantity, packaging sizes height, width and depth in cm, empty space measured above the product in cm at time of opening new package directly after purchase and whether consumers can see the content and

level of filling from the outside. I opened each packaging, used a standard measuring tape and made notes.

What is slack-fill?

Firstly we need to differentiate 'functional slack-fill' from 'non-functional slack-fill'. We also need to understand why functional slack-fill is needed or applied in packaging.

Functional slack-fill is empty space inside a packaging for a valid reason. One valid reason for functional slack-fill is product protection. Good examples are packages filled with chips or cookies. The extra space prevents damage of the product by outside pressure, without this empty space your product would crumble.
Another valid reason is avoiding product loss due to spilling when opening the package and 'settling' is another reason. Some products fill up a package at production time and the product 'settles' to a lower level inside the packaging over time, for example flour.
A technical reason is the closing process of the packaging after it is filled in a production line of the producer. There needs to be an allowance of extra material to seal the packaging properly, which in some cases and depending on the type of packaging results in some empty space.
This is a video published by a filling machinery supplier showing the filling process of pouches. This is another video explaining how a Spout Pouch is made, filled and sealed. This article covers more technicalities of the filling process and factors which need to be considered, such as product properties for a correct pouch-filling process, accuracy of filling and environmental conditions influencing the dosage.

Despite the fact that the empty space in a packaging is qualified as 'functional slack-fill' some questions rise: Is the packaging optimally designed with the climate and the waste crisis in mind and could redesigning that packaging avoid the need for slack-fill. Possibly the machines used for sealing the packaging can be reviewed to reduce slack-fill?

"Non-functional slack-fill aggravates the climate crisis, it aggravates the waste and plastic pollution crisis. Non-functional slack-fill results in waste from packaging which should not have been produced at all"

Slack-filling can also be non-functional. Basically, the criteria for non-functional slack fill are any criteria which do not apply to functional slack-fill.

Non-functional slack-fill is a neglected topic. Publications on regulating slack-fill scarce and U.S. lawsuits are mostly related to misleading consumers and not to the unnecessary use of materials, of which the majority of certain packaging materials is not effectively being recycled.

Double or multi-layer paper sachet, mixed materials. Height 14,9 cm x 12,6 cm width
Empty space** above the product in cm at time of opening new package directly after purchase : **9 cm

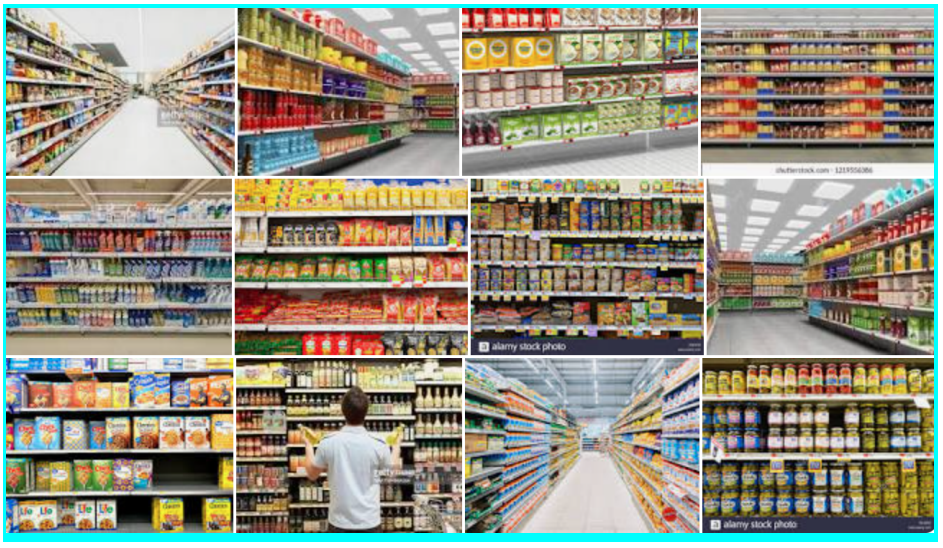
Packaging materials

Non-organic packaging is made from plastic, glass, cans, aluminium, carton, paper or a combination of the above.

It is worth mentioning multi-layered flexible packaging because it is so abundantly used and is not readily recyclable. Multilayer or composite materials are made with innovative technologies aimed to give barrier properties, strength and storage stability to food items, new materials as well as hazardous materials. The material of construction of multi layered packaging ranges from paper to plastics to metals. (source)

It is also worth mentioning the stand-up pouch which was developed in 1963. The original stand-up pouch was invented by Louis Doyen which gained US Patent in 1968 for the Doyen stand-up pouch design. This simple Doyen design is created with two flat sheets sealed together along the sides, with a "W" fold (gusset) running along the bottom and then sealed to the edge of the tube with an upside-down U-shaped section. When the pouch is filled the gusset provides a round base for the pouch to stand. The original Doyen design is sealed across the top, however various designs include additions, such as a spout or a mechanism to reseal the packaging. (source).

Marketing and packaging on supermarket shelves



For most brands their packaging is the most effective way to communicate with consumers. Strategies on influencing consumer behaviour and increasing sales are directly related to packaging design.

Attractive packaging stands out and seduces. Brand-owners are influenced by competitors and the characterises of their packaging. For both brand-owners and supermarkets it's relevant that shelves look attractive. You can find publications by marketing companies and academic studies online on how positioning products in supermarkets matters and influences buying patterns and consumer satisfaction; for example position and increasing sales, which products to position on which eye-level to reach which age-group. The space height of the shelves also matters; a supermarket needs to use available space in the most efficient way.

"It seems as if the height of packaging is matched to shelf heights"

Average shelf height for foods in my local Dutch supermarket is 20 cm and the height of packaging in most instances matches that height. The shelves look full. In itself this is understandable from the point of aesthetics, packaging in all sorts of heights would create a messy sight. Shelves in some sections differ, for example the space dividing shelves containing vitamin and mineral supplements and medication is lower and there are more shelves in the display to accommodate the smaller size packaging.

This raises the question: is the packaging height customised to fill up shelves for marketing reasons?

Misleading consumers

Non-functional slack-filling misleads consumers. In many instances brand owners, including supermarket house-brands, deliberately use packaging which is bigger than needed for various reasons.

"More value for money can be deceptive"

One reason is creating a feeling of ‘more value for money’ by using a larger packaging. Consumers need to rely on the amount of grams or pieces printed on the packaging when the product is packed in non-transparent packaging. The content is not visible from the outside. By touching a flexible non-transparent packaging consumers can feel if a packaging is not full.
When the number of pieces is mentioned it is clear what you get for your money, although I think a larger packaging size than needed can still be misleading. If grams are mentioned it is harder to relate that amount to the packaging used.
Another reason is ‘standing taller than your competitor’s brand’ on supermarket shelves.
In some instances a brand-owner starts off by marketing a product in a certain size of packaging. At some stage they start selling the same product with lesser content. The amount sold decreases while the packaging stays the same. For example; 300 gram peanuts in a 20 x 10 cm bag is sold for 3 euro. At some point that same size bag is filled with 200 gram while the price remains the same. Only critical consumers would notice they get less value for money. This practice leads to both misleading consumers and non-functional wasteful use of packaging material.

Slack-fill legislation related to misleading consumers

Consumer protection rules cover ‘misleading consumers’ in various countries. Legislation on slack-fill in particular is hard to find.
In the U.S.: the Food, Drug, and Cosmetic Act is a U.S. law that regulates slack-fill. It defines non-functional slack-fill as “the empty space in a package that is filled to substantially less than its capacity"according to a final regulation published in the 1993 Federal Register, defining the circumstances in which the slack-fill within a food package is non-functional and therefore misleading.
Devising official slack-fill definitions was part of the agency's ongoing implementation of the Nutrition Labelling & Education Act. The FDA outlined circumstances under which an empty package can be filled to less than its capacity. Under the regulation, a product is deemed to be misbranded if its container is "misleading." A container, in turn, is considered to be misleading if it contains non-functional slack-fill.
Those existing criteria of functional-slack fill in the U.S. are not related

towards reduction of material use and reducing the impact of excessive packaging on the climate, waste and plastic pollution crises.

Printing on packaging

In 1993 a U.S. producer of dietary supplement products argued that the definition for non-functional slack-fill should not apply to dietary supplements "when a minimum package size is needed to accommodate a label bearing information required by FDA, by other state or federal law, or by commercial necessity".
In other words: where brand owners are regulated to print readable lists of ingredients there might be need to use larger packaging than needed. This argument could be valid however solutions should be devised.
The use of QR codes redirecting to this information could reduce print space.

“Some packaging is given an additional function, doubling as a cook book”

Directly related to print space allocated on a packaging and marketing: I’d like to give the example of the inspected packaging #16 in the product file. This concerns a carton box which has slack-fill. The box contains three products - rice, herbs and spices - to use in preparing Risotto; each product is individually packaged and all contain slack-fill. The outer box has print with information on both the inside and outside; it includes a complete list of instructions on how to prepare each of three variations of Risotto, with a list of additional ingredients to buy for each version.

Product #16 Risotto, a combination of four packagings with non-functional slack-fill

The #16 product raises more questions:
First of all, why is a multilayer sachet size 13.4 x 11 cm wide needed to hold 24 gram of mixed spices? After cutting off the closing seam at the top I measured 9 cm empty space from the top of the product to the top of the packaging.
Another question is: what are the benefits of this type of combined ingredients packages for consumers? Three ingredients are individually packaged and you are advised to buy four to six additional ingredients to prepare one of the three suggested dishes as printed on the box. Various other brands offer similar combination packages which need to be complemented with additional products. What are the benefits of such incomplete combination boxes? Is it for 'convenience'? Does it prevent food waste?
And finally: all four packaging in this product contain considerable slack-fill, is this acceptable?

Slack-filling legislation directly related to addressing the climate, waste and plastic pollution crises

Globally there is no legislation which directly links non-functional slack-filling to the impact on the climate, waste and plastic pollution

crises. In circular economy development policies, strategies and action plans the focus is mostly on redesigning packaging for reuse, material choice and composition and its recyclability, system change and alternative delivery models. Brand-owners are not regulated on non-functional slack-filling for reasons of excessive material use.
In EU legislation there is not a clear framework of maximum permitted slack-filling in Europe. It is not included in the European Packaging and packaging waste directive 94/62/EC

Consumer behaviour

Publications and campaigns to engage the public in actions to mitigate the climate, waste and plastic pollution crises are having a positive impact and have changed consumer behaviour. However, awareness about the impact of empty space in packaging is still low.

"Is our perception of 'value for money' related to the size of a packaging?"

We must reflect and ask ourselves critical questions. For instance, does size matter as long as you know you purchase the amount in grams or pieces you need? Would you choose not to buy it if packaged in the smallest possible size?

Product #15 10 gram mixed spices in laminated sachet 12,8 x 8 cm

Take a closer look at Product #15 examined: a sachet measuring 12,8 x 8 cm and containing 10 gr mixed spices. After opening I measured 8 cm of empty space inside the sachet. Would you buy the product if it had no slack-fill and if it were packed in a smaller sachet measuring half the size and subsequently looking quite small ?
We are used to the single-portion sugar in a small sachet and served with our coffee, average containing 3 or 4 gram sugar. Could the 10 gram product #15 be sold in a similar size sachet with required barrier properties?

Concluding

It is clear that some of the packaging I inspected can be down-sized considerably. The unnecessary and excessive use of packaging aggravates the climate, waste and plastic pollution crises, in all stages from resource extraction, production, distribution, transport in collection systems, landfilling, incineration and recycling. Mismanaged waste which has no or low recycling properties creates additional burdens such as open burning of flexible packaging, a practice which is widespread in most parts of Asia and Africa. This causes CO2, Black Carbon and toxic emissions. Aggravating those burdens by using unnecessary packaging is unethical.

"Every centimetre counts. Packaging which is used for no valid reason cannot be classified as sustainable production and consumption and is unethical"

Packaging which is used for no valid reason benefits only the oil & gas sector, plastic and paper producers, chemicals producers, packaging producers, brand-owners, supermarket sector and transport companies.

Producers need to take action on redesigning packaging, not only regarding material choice and composition; they also need to refrain from applying non-functional slack-filling in their packaging for marketing reasons.

Consumers can be diligent and review their packaging. Consumers can be proactive; they can contact the customer service of producers of the products they purchase and request avoidance of non-functional slack-fill, or alternatively they can choose not to buy products with non-functional slack-fill in packaging.

Notes and acknowledgements

The inspected products were randomly chosen and not with the intention to single-out particular companies. The selected products stood out in my local supermarket as not full at first sight or feel. I am not a packaging designer. I did consult a supervisor of a factory filling line for insights on the filling process of multi-layer plastic pouches. I looked at the packaging from my personal perspective as a consumer. All brand-owners mentioned in the product file are invited to comment and share their insights on why their inspected product packaging is not full.

Non-functional slack-filling is a persistent practice on a global scale. Together with members at International Waste Platform we dig deeper into this problem.
In our open letter to UN we recommended to include policies and

regulations on non-intentional slack-filling in the Global Agreement on Plastics.

Illustrative examples

Link to product file of inspected products, all examples of non-functional slack-filling used in products sold in The Netherlands.

Further reading

- The influence of the height of shelves and width of aisles on store image and customer satisfaction, Wageningen University, Marketing and Consumer Behaviour, Bachelor thesis YSS - 82312 Inke Frickus link
- The 3 P's of Shelf Presence, Repsly, Victoria Vessella link
- 10 Simple Supermarket Marketing Strategies, Tweak link
- The EU Packaging and Packaging Waste Directive (PPWD)

#Packaging #Marketing #ClimateCrisis #PlasticPollutionCrisis #ClimateAction #ClimateReality #DoYouKNowYourPackaging #SustainableProduction #SustainableConsumption #BehaviourChange #Transparency #Environment
#SlackFill