Appendices

Charlotte S. de Wit

Reducing the environmental impact of on-the-go food packaging

A search for new solution spaces

TU Delft

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CONTENT

A. Solution space tree poster

The poster can be found in the sleeve on the inside of the cover of the main report.
A digital version of the poster is uploaded separately to the repository

B. Solution space tree verification session

The first layers of the solution space tree are created by deduction. If the deduction steps are done correctly, the first layers of the solution space tree cover the entirety of solution spaces. This is hard to verify. To still have some indication of the tree's completeness, found solutions can be verified to fit within a solution space of the tree.

If I would think of different ideas myself, that would be trying to verify my own thoughts with my own thoughts. By asking other people for ideas, the solution fitting test will make more sense.

Approach:

People from the *Food and Eating Design Lab* of the TU Delft are asked to participate in a verifying group brainstorm session. All solutions that people in this group can come up with, will be tested for being able to be accommodated within one of the solution spaces in the solution space tree.

Participants are asked to name any idea they can think of, weather the solution is realistic or not.

Results:

6 people participated in the brainstorm session. All unique generated ideas are listed down in table 1. For every idea, the associated solution space is listed in the table as well. The solution space is noted by listing the solution spaces from upper layers, creating a path to the solution space. Only the first layers of the solution space tree are taken into account for the table, since falling within one solution space from the first layer is already enough to show the tree covers the solution.

Eat the packaging	Make it end up somewhere else, different form, chemical reaction
Reduce amount of material	Prevent packaging, individual packaging
Deposit system	Make it ed up somewhere else, same form, reuse
Send all waste to the moon	Make it end up somewhere else, same form
Use foam, so less weight	Prevent packaging, individual packaging
Pass it on	Make it ed up somewhere else, same form, reuse
Something you need anyway	Make it ed up somewhere else, same form, reuse
Decomposable packaging	Make it end up somewhere else, different form, chemical reaction
Use again with other function	Make it ed up somewhere else, same form, reuse
Herbs → grow new food in old packaging	Make it ed up somewhere else, same form, reuse
Food can become packaging	Prevent packaging, individual packaging

Everything home made	Prevent packaging, number of packaging
Packaging as payment system	Make it ed up somewhere else, same form, reuse
Pay separately for the packaging	Prevent packaging, number of packaging
Packaging collector's item	Make it ed up somewhere else, same form, reuse
Attach to packaging, create piece of art	Make it ed up somewhere else, same form, reuse
More recycle bins	Make it end up somewhere else, different form, recycling
Mobile carry on recycle bins	Make it end up somewhere else, different form, recycling
Drink yoghurt from a bulk container	Prevent packaging, number of packaging
Stir with your finger in your coffee	Prevent packaging, individual packaging
A sticker saying: I'm going to recycle	Make it end up somewhere else, different form, recycling

Conclusion and discussion:

Every mentioned solution idea could be accommodated in one of the solution spaces of the first layers of the solution space tree.

Since participants were all related to the food and eating design lab, a focus towards this field could implicitly have been there. Brainstorming with people from different backgrounds might result in different solutions.

C.Solution space tree with solution direction clusters

The poster can be found in the sleeve on the inside of the cover of the main report.
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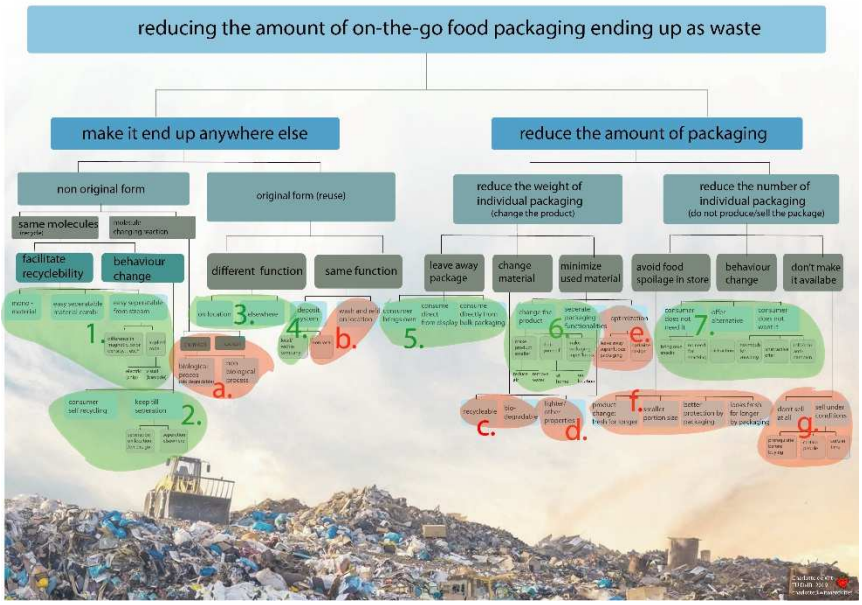

D. An interview with on-the-go product retailer

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To collect information from a retailers perspective, an interview is conducted with:

Liliane van Heteren, manager in the sustainability department of the AH-to go

AH-to go sells convenience products in dozens of stores on locations like train station, airports and shopping areas.

On Tuesday 16 April, a phone conversation took place.

The conversation provided the following insights:

The AH-to-GO shops are slightly different in different locations. It all depends on the amount of people passing by at the shop. A few meters can make already make a huge difference.

Most places like train stations or city centre areas only have one AH-to-Go store. Only at Schiphol there are two store locations. One of these stores lies on a part of Schiphol that every person traveling by place must pass. The other one is a few tens of meters away from this main route. When comparing the amount of customers and the profitability, it makes a huge difference. The one that everyone stumbles across sells products to a lot more customers.

AH-to-GO really focusses on a fast easy and quick buying process for the consumer. New products, store furniture and products adaptations are always made by taking the fastness into consideration.

They will for example never make a salad bar instead of the prepacked salads they sell now, since this salad bar will massively reduce the fastness of the purchase.

AH- to go took steps to speed up the buying process by introducing self service check-outs. This resulted in a significant increase in products sold.

AH-to go is currently working the issue of their bread and pastry packaging for products that are packed ‘in-store’. These packagings are not made out of a mono-material. They mostly use paper bags now, with a plastic window to show the content of the product. This plastic window could be teared of by the consumer to dispose it a plastic recycle bin, but that is not what most customer do. AH-to go is looking for an alternative for the paper bags with windows that are biodegradable.

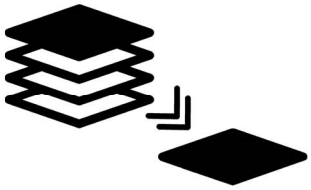
AH-to go is also working on a collaboration with other shops that are often found in the same area as their won stores, such as Mc Donald’s, Starbucks and Kiosk. They all have the same problem: The drinking cups are made out of paper, but a plastic coating makes it impossible to recycle this cups. Recyclable alternatives exist, but are not available for a competing price. By looking for a supplier together, the companies hope to decrease the price.

Liliane also noted that recycling bins are often not found around their stores. Since most of their stores are found within a NS train station, AH-to go is in conversation with the NS about placement of recycling bins at every train station.

Albert Heijn is Already working on:

Recyclable coffee cups

Recycle posibilities on -the-go



Mono material packaging

E. A personal explorative packaging experience

To gain insights on the experience of on-the-go food packaging (waste), 2 types of personal explorative research are executed. One in which an existing alternative for disposable cups is used and one in which packaging waste in not thrown away after use but kept.

Results:

The reusable cup experience

At the start of the project, I bought a reusable cup to experience this alternative myself and find out what possible failing points of this, not commonly used, alternative are. The cup would replace all disposable cups I would otherwise have used during this project.

My choice was a collapsible cup from the Stojo brand, as shown in figure 1. The collapsible part is not only to flexible but also gets too hot for comfortable holding of the cup when it is filled with a hot beverage. A white ring, which has to be removed before collapsing makes sure the cup can be hold comfortably.

Figure 1: Collapsable drinking cup from the brand Stojo

The experience made me realise how convenient convenience products actually are. At first, the drinking experience was quite pleasant. But the cup got lost in my bag, became very dirty without a regular wash and ended up feeling totally unattractive. Even after cleaning it, the dirty association did not go away. Since the ring for comfortably holding the cup, needed to be removed before collapsing, it was very easy to lose this part. After I lost it, the drinking experience became even worse.

After a while, I didn't feel an expensive drink on-the-go was worth the money when drunk from this cup. So I stopped buying warm drinks on-the-go until I came to the point that I dropped the experiment and used disposable cups again.

For me, it became clear that the pleasant convenient disposable cups are a huge part of the experience of the treat I permit myself when buying a drink. Solely the drink itself isn't worth the money and carrying a reusable cup around and regularly cleaning it isn't worth the trouble.

During my research, I also used the cup to start conversations about the cup with people I met. Some people though that drinking form the reusable cup is more pleasant since it is heavier and the material feels more luxurious than the standard disposable paper cups. Others disliked the design by the use of plastic.

Many people admired the action of bringing a reusable cup. They saw it as a sacrifice made to help to reduce negative impact on the environment. The fact that people see bringing your own cup as a sacrifice, rather than just a different way of consuming a beverage on-the-go, suggests that it is seen as a less pleasant alternative than disposable cups.

The packaging collecting experience

I also started to collect all sorts of packaging. Instead of throwing away my waste as I would normally do, I devoted a special bag to saving up all packaging I used. I carried the bag with me for 3 weeks.

Not disposing waste made me perceive it as more valuable. Although there was a significant difference between clean and dirty packaging. Clean packaging felt like objects that could be treasured, while I felt repugnance to add a dirty packaging to my collecting bag. When people around me saw me collecting my waste, they offered me their empty packaging as well, but only if it concerned clean packaging. When I asked people about their behaviour after this observation, the answer mostly was: Giving away dirty packaging does not feel as a polite thing to do.

I used a canvas bag, to make sure air could come in. This is needed so the tiny bits of food that remained in the collected packaging will dry out instead of rot. The difference in perception between dirty and clean waste might be caused by the unconscious fear for contamination, mold and rot.

Heavier packaging feels more valuable than more lightweight packaging. The weight itself plays a role, but also the fact that more heavy packaging is often designed in a way the packaging stays intact after opening. A flimsy, teared apart piece of plastic is experienced as waste, while a sturdy pot with a re-closable lid feels like it needs a second application. The effect is stronger with clean intact packaging than with dirty intact packaging.

At the end of this explorative packaging experience research, I wanted to dispose all packaging in the right bin for recycling. By this time, I already had done quite some research in the area of packaging recycling. But still, it was difficult for me to be sure for every packaging which one of the recycling bins is the correct one. It shows how complicated it is for consumers to separate their waste in the right bin and not disturb the recycling process.

F. Interviews with on-the-go customers

Approach

To collect qualitative information, consumers who just bought a food item on-the-go are observed and interviewed. Participants are asked to answer a few questions outside a AH-to go store on locations Delft and Rotterdam. The following questions are used as a guideline for these brief interviews:

- What did you just buy?
- What was the reason to buy this?
- How much do you like the purchased product?
- Are you hungry/thirsty?
- Did you plan to buy this?
- If this product was not available, what would you have done instead?
- Would you consider bringing food from home? Why?
- Do you ever pay attention to sustainability when you purchase food?
- Where are you going to dispose the packaging?

First, the walking path through the store of participants and their behaviour, before their item of choice is purchased, is observed without them being aware of it. When the participant walks out of the store after purchase, the participant is asked to answer some questions about their purchase. To not exclude ruched participants, people who are in a big hurry are interviewed as well, if people allowed, by walking along with them to the train platform while asking the questions.

Interviews are conducted on different interview moments, during meal times and in between.

Results

In total 43 participants are interviewed on different days and Ah-to go locations of which 8 during breakfast time (between 8:40 and 9:10) in Delft, 11 during lunchtime (between 12:30 and 13:10) in Rotterdam, 13 in between lunch and dinner time (between 15:30 and 16:00) in Delft and 11 during dinner time (between 18:10 and 18:40) in Rotterdam. Most encountered people were willing to participate. Only a few refused, mostly for the reason of being in a rush.

Every interview moment took between 30 and 40 minutes in which participants are observed and interviewed right after each other. Every interview moment stopped when the point of saturation was reached in the answers of the participants.

No noticeable differences where observed between the interviews in different interview moments and location.

Observation results

Only one of the interviewed participant walked strait towards the product he was going to buy. Most people walk through almost the whole store before deciding what to buy. Some people skip certain product categories, but looking at different types of products before choosing a product is most common.

Only a few people pick up products to read the information on the packaging. While participants took the time to see the whole store, the decision for a certain product within a product category goes mostly quickly within seconds.

Interview results

More than half of the participants was not hungry or thirsty at the moment of buying food or drinks on-the-go. These people gave various reasons for buying these products like, feeling drowsy, killing time, craving for a sweet or a salty flavour and spoiling themselves with a treat.

Among the customers without hunger, the choice of food varied between unhealthy perceived junk food like 'frikandelbroodjes' and candy, and healthy perceived foods like sliced fruit, juices and vegetable snacks.

A much smaller part of the interviewed participants buys food and drinks on-the-go while being hungry as one of their main meals, as a habit. They are the only people that indicated they more or less planned to buy something. Most of these people buy these products every day since they prefer this convenience over the lower price that comes with preparing and bringing food yourself.

Around one third of the interviewed participants was buying food because they were hungry, but do not buy on-the-go products on a regular basis to replace one of their main meals. They only buy them when they did not manage prepare and bring their normal meal. They mostly indicated not to have planned buying food on-the-go, but made this plan as soon as they realised there was no other opportunity for them to get food.

Within this group, many participants who very much liked the taste of their purchased product indicated they went for less healthy options when buying on-the-go and would normally eat more healthy. Within this group people used sentences like: 'I was not able to get breakfast at the place where I slept, so now I *can* buy something in here.' They also use words like 'allowed to buy' and 'this is an exception'.
People who did not particularly 'like' the product they just bought did not mention their normal eating habits in the interview and used words like 'I *have to* buy from this store', 'No other option', and 'a lot of money for..'

Discussion

People mostly walk through the whole store before deciding what to buy. It suggest that people do not know on beforehand what to buy, or at least leave the opportunity open to buy something else. Very few read any packaging, suggesting they only use the looks of a packaging to decide in the store what to buy. Of course, customers also might already be familiar with a product or have read the packaging of choice before.

The interview results suggest on-the-go customers can be divided in 3 different groups, each having their own characteristics:

The smallest group consists of people who created the habit of buying their meals on-the-go. They are willing to pay more for the convenience these ready to eat products offer and buy regularly at convenience shops, with most of the interviewed people doing this even daily.

The second group consists of people who have the habit of eating their meal somewhere indoors or bringing their meal from home, but do occasionally not plan well enough to realise this. Buying their meal on-the-go is seen as a quick fix for their rushed schedule. This group can be divided again in two groups, from which the first one is suggested to be the largest: 1) People who are sensitive to the beckoning offers from convenience shops. Since these people know there are attractive offers sold on-the-go, the effort to realise their originally planned meal decreases. Not planning well can be their excuse to buy the often less healthy and more expensive products in convenience stores. 2) People who are not influenced by the offers and despite their best efforts did not make it to fix their originally planned meal in time. They tend to look for the best price/nutrient balance in the on-the-go item to be purchased.

The third group, which is suggested to be the largest, consists of people who did not plan to buy something on-the-go. They did manage to fix their planned meals on time. They are not hungry or thirsty and are buying food on-the-go because they are seduced by the products. The food purchase is providing a positive impulse for people who are bored, tired, frustrated or for other reasons looking for some enjoyment.

Figure 2 gives a visual summery of the 3 groups, the subdivision of the second group and the characteristics of the biggest group.

There were mostly rushed people among the people who did not agree to participate in the study after approaching them. People who are in a hurry are not looking to kill some time. Most of the interviewed people where not hungry, their share might be lower if more rushed people participated, since al lot of people without hunger were also killing time.

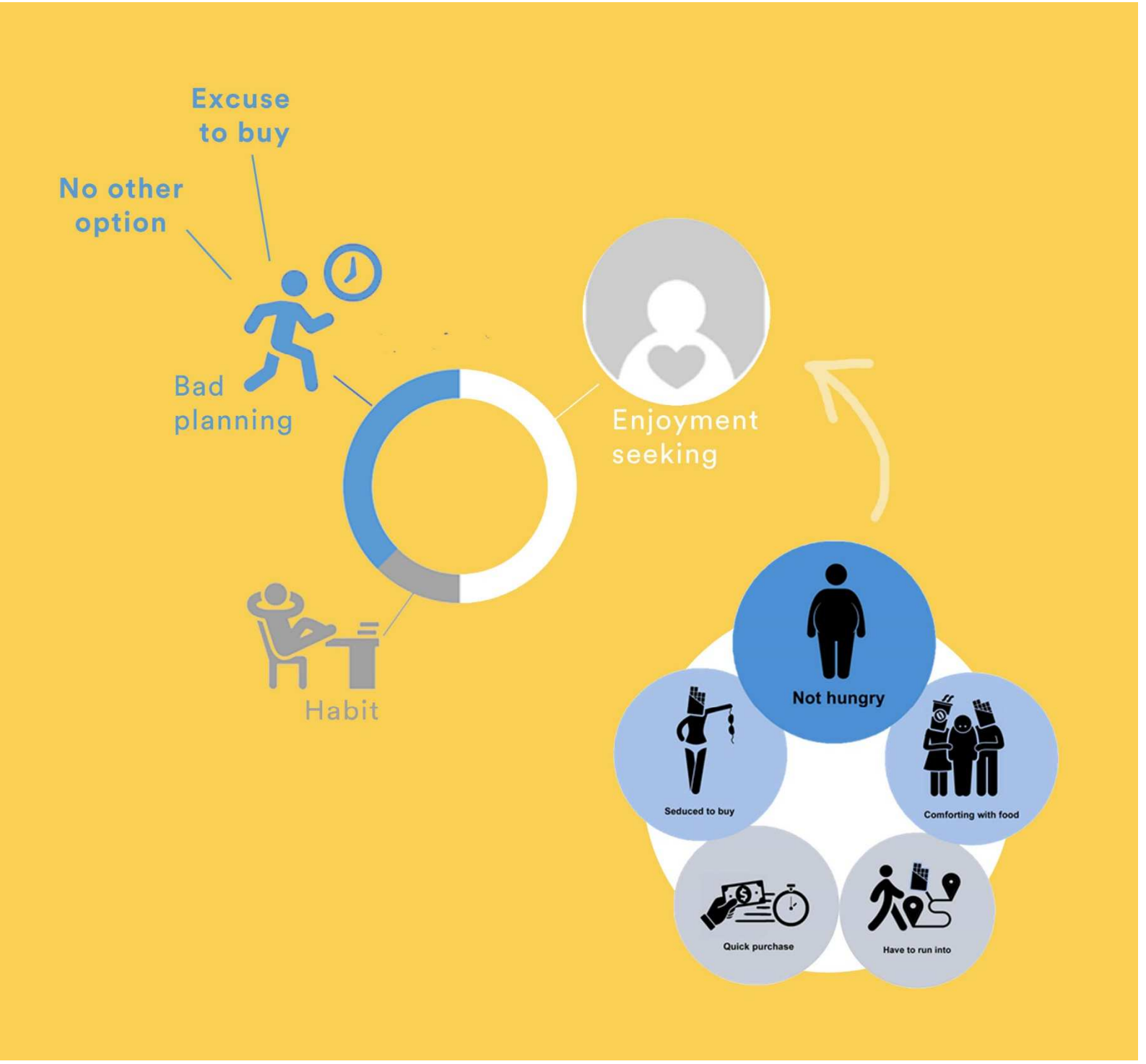


Figure 2: A visual summary of the different types of customers

G. The design of a reusable tray and disposable sticker for prepacked wraps

An alternative packaging design is created for the Qizini Chicken tandoori wrap, discarding the cardboard cup and replacing its functions by a reusable tray.

The goal of the design is to provide a realistic scenario to test if the *presentation shifting concept* has potential. Small changes in the execution of the concept might change the outcomes of qualitative user tests significantly. So the test design should be made in a way that it can actually be implemented.

The replacement by a tray involves changes in tasks for the retailer's employees, changes in handling and changes in logistics that need to be taking into account while designing. This appendix provides information about the reasoning towards the taken decisions, as well as estimations of material and impact savings for the specific design compared to the Qizini design. By means of an interview with a shop employees about this design, it is verified it is indeed realistic to be used by retailers. A discussion on the design can be found at the end of this appendix.

Design descions

Description of the product

The base design (figure 3) holds 3 wraps and consist out of 4 baffles on a baseplate. The baffles are bended on the edges, creating a more sophisticated shape. The design can be adapted to hold other amounts of wraps and can be transported as a flat piece of cardboard.

The tray takes the same amount of shelf space per wrap as the current Qizini design with a cardboard cup

Figure 3: The tray design

Separate places for every wrap

Budget supermarkets often use the secondary packaging for presenting their products in the store since it saves labour costs.

The designed tray must provide the same luxury feeling as the removed cardboard cup. Putting the wraps all together in one presentation tray will be associated with budget supermarkets. Figure 4 shows wrap presentation in budget supermarket Aldi. The wraps are presented an individual packaging as well as in a box together.

At the same time, not providing a separate place for every wrap makes it harder to keep them in the correct upright position.

The wraps are cut in half with an angle. The angle makes sure, just like with sandwiches in a triangle packaging, that the filling of the wrap is visible in most viewing angles, provided that the wrap is standing upright.

Figure 4: Products in a secondary pacaging presentation at the Aldi budget supermarket

Shelf depth

The design is made to use the least amount of (valuable) shelf space as possible. If the depth of the shelf is deeper than the tray, the last baffle at the back can be bended just like the other baffles, to hold the wrap in the upright position. If the shelf is just deep enough, the last baffle can also stay flat, saving space. The back wall of the shelf will provide the force to keep the wrap
on the back in the upright position. Figure 5 shows the two possible situations.

Figure 5: The last baffle can stay flat to save space

Fitting in every store and shelf

Every store is different. Some stores use low table displays, while others use more closet like displays. To make sure the design fits in every store, the design is modular. By observation is found that most stores place no more than 3 wraps behind each other. That is why the default size of the tray is for 3 wraps.

When the shelf is less deep, starting from the front, baffles can be removed by ripping it of on the pre-cut tear-off edges between every baffle (figure 7).
When the shelf is deeper, more trays can be combined by tearing-off the right number of baffles starting from the back and placing together the remaining parts.

The individual places for the wraps have no sides since they must be able to bend forward for the picking up movement and placement movement. But there are also no side edges for another reason. Some stores use dividers on their shelves who match with the ambiance of the store. Providing a tray with an edge would make it look silly if there is already a divider on the shelf (Figure 6).

Figure 6: Some stores use dividers on their shelfs

Figure 7: The standard size of holding 3 wraps can be changed by tearing of the different compartments. Different parts can be combined into bigger trays.

Picking and placing movement

The height of the shelf space can be limited (figure 9), and people like to pick up their wrap in a smooth movement.
If the baffles between the wraps are stiff, the wrap first needs to be translated upwards before it can be moved towards the customer.

When the shelf if not high enough, there is simply no space to move the wrap upwards. The other way around holds for the employee who is filling the tray with wraps.

When there is no tray, people pick up the wrap from the flat shelf by turning the wrap a bit before pulling it towards themselves, since this is a natural movement for human hands.

The same natural movement should be possible while using the new tray design. To accomplish this, the baffles that keep the wraps in place are designed to bent to the front while grabbing or placing a wrap. The baffles will return to their original position afterward.

The baffles will support the wraps and cannot bend to the other side since the sides are folded.

The folded sides also help to move the centre of mass of the baffles a bit more to the back which helps with returning to the original position.

The baffle mechanism is established after multiple design iteration and rough prototypes. In earlier designs, extra parts and materials where used like hinges or L-shaped pieces of rubber to realise enough support while realising movement in the baffles. The design is simplified massively by, as a break through, using the cardboard fold in the right direction.

Figure 8: The baffles can bend forward to make sure a smooth placing and picking motion is possible.

Figure 9: sometimes the shelf height is limited

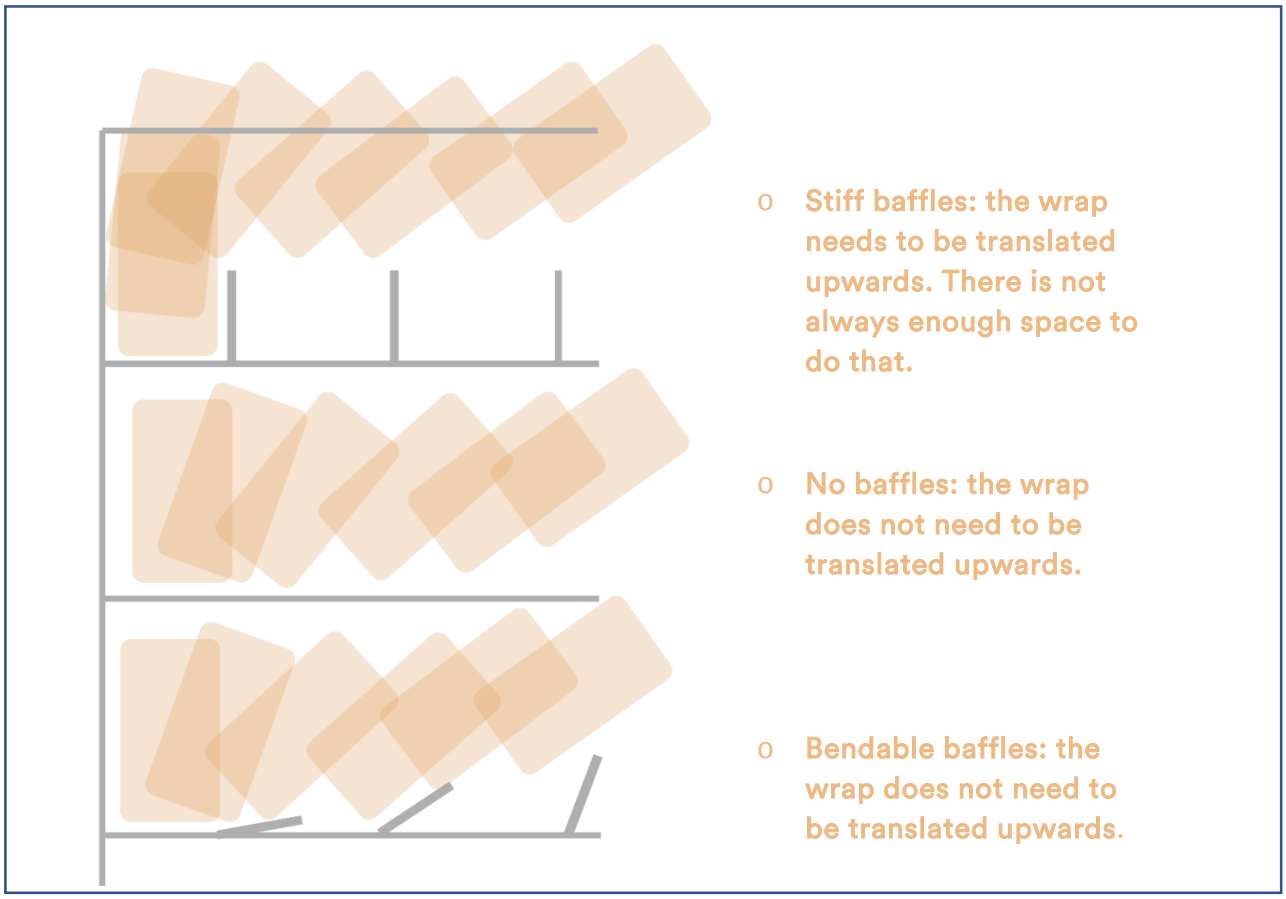


Figure 10: Side view of the movement of grabbing a wrap in 3 situations

Figure 11: White spots in a ray design indicate empty places

Ground plate

The ground plate (figure 12) is designed to fill up the 'empty places' that are visible when a wrap is taken out. Filling up these spaces with graphic design will give the tray an attractive look, even if it is not filled up with wraps completely. Figure 11 shows an example of tray design in which the empty spaces are white.

But the base place also serves another function:
The weight of the wraps will push on the baffles, creating a momentum. The shelf surface will provide an upright force through the folded edges of the baffle and the stiffness of the material should be strong enough to provide a downwards force at the point of the 'joint'. The sides of the top plate, that run alongside the baffles, are not stiff enough to hold the baffle on its place. The momentum will cause the baffle to rotate backwards, lifting the baffle up from the ground. The ground place does provide enough stiffness to prevent this from happening (Figure 13).

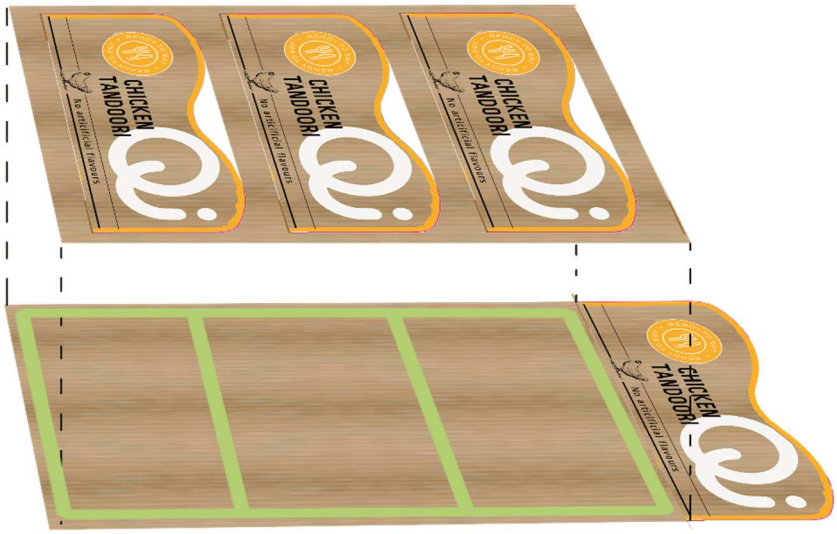


Figure 12: The design is made out of two parts 1)base plate 2)baffle plate

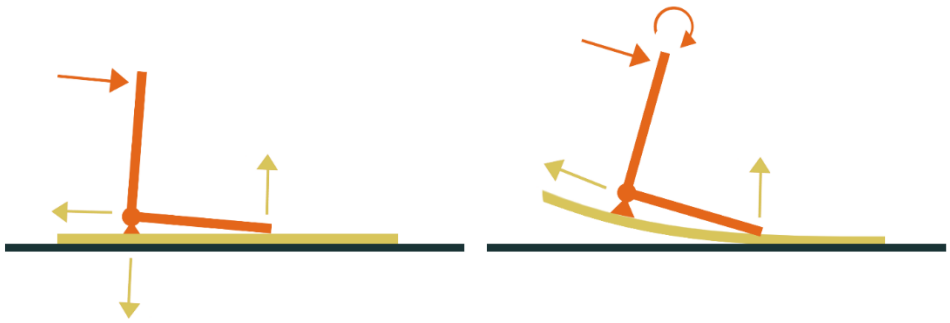


Figure 13: left: with a stiff ground plate the baffle will stay vertical right: The ground plate will bend if it is not stiff enough to withstand the momentum.

A two pieces design

The easy producible design is made from two pieces (Figure 14) of cardboard glued together. It is possible to make the ground piece and the top piece out of one piece of cardboard which can be folded. It would be easy for outlining since the fold will outline the to-be-glued parts automatically. It is not chosen to do so since it is uncommon to print this type of cardboard on both sides, which would be necessary in that case.

Figure 14: the two pieces of which the design consists

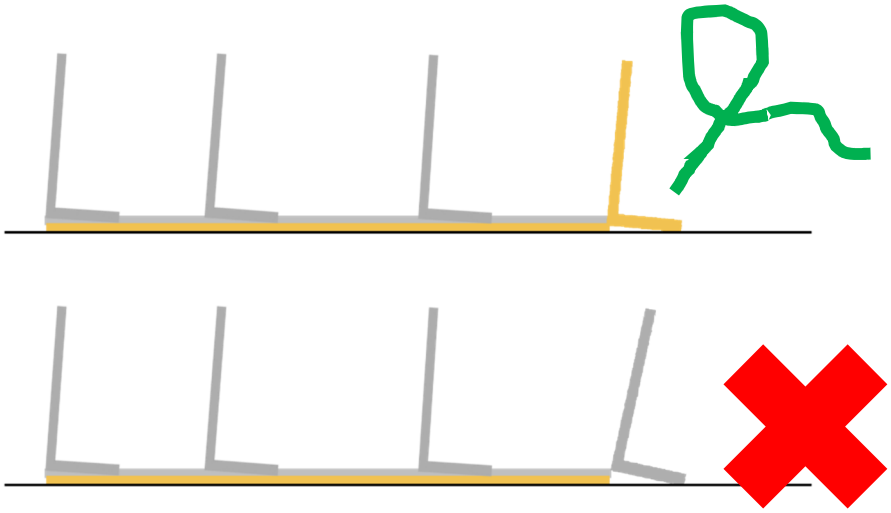


Figure 15: schematic sideview of the tray. First: situation with last baffle attached to the ground plate. Second: last baffle attached to the upper plate

All baffles are attached to the upper plate and are bend at the sides to be able to support the wraps and not bend back into the transport position. Only the last baffle is attached to the ground plate, and not on the upper plate. This is because the cardboard has a thickness. All other baffles lean on the ground plate, 1.5 mm lower, with their bended sides. Since the last baffle needs to lean on the shelf surface, the baffle is attached to the ground plate. Otherwise, the baffle will look different since the last baffle than needs to bend further (1.5+1.5=3 mm lower)and make a bigger angle to reach the supporting surface (Figure 15).

Easy transportation and unfolding of a new tray

The tray is produced and transported as a flat packaging. The size of the flat tray is not bigger than a standard A4 paper and only 3 mm thick, which makes handling during transport easy. The small flat packaging is not vulnerable for being bend and damaged.

The baffles are designed with a nice curve. It follows the round formal language of the original Qizini packaging design and enhances an attractive product presentation by looking more sophisticated than a rectangular shape.

The curve allows for easy unfolding of the tray by the store's employees since a space is created for the fingertip.

The sides of the baffles are easily bend since the folding lines are prepared in the factory.

Measurements

The measurements (Figure 16) are based on the size of the wrap. It takes no more space than 3 wraps in the original Qizini packaging. By prototyping, the best working distance between the baffles is found for easy placing of the wraps in the upright position and easy taking out the wraps. The height of the baffles is no more than the space between the baffles to make it possible to create them out of one single layer of cardboard.

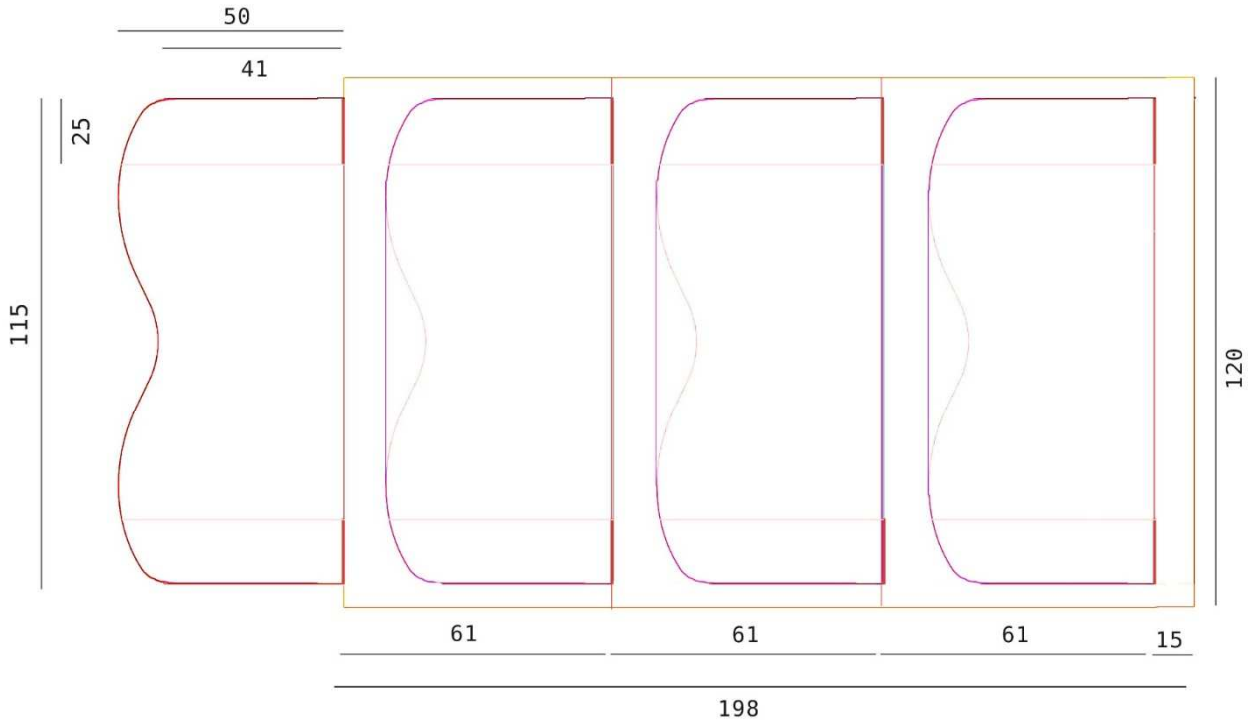


Figure 16: the measurements of the cardboard for the design

Graphic design

Graphic design can make a huge impact on the customer experience by using different colours, fonts and shape language. For the graphic design in this case, the ambiance of the current Qizini packaging is mimicked, since only the shift of the presentation function to a reusable tray is tested, not the used graphic design. This is done by copying elements from the current Qizini packaging design and only adapt them to the new shape of the tray. A sticker (Figure 17) is designed to be attached on the plastic foil. The sticker fulfils the lawful packaging information rules and is partly hidden by a baffle when placed in the tray. Apart from providing information, the sticker also takes over another function of the removed carboard cup: Covering the sides of the wraps. By prototyping it is concluded that the cardboard cup covers the side of the wrap for a reason. The wrap filling needs to be visible and looks attractive, showing also the sides of the wrap makes it look less attractive.

The flavour of the wrap is printed on the tray as well as on the sticker, to make sure the shop employees do not mistake or coincidently swap the flavours while filling the shelves.

The expiring date is printed on the top of the sticker to make sure it is visible while in the tray, to make it easy for the employees to check the expiring date.

The sticker does not have the same orange edge as the tray and the original cardboard cup. This is because the wrap could be placed in the tray in a slightly tilted position, or the sticker machine could place it unprecise. Leaving away the orange boarder makes it look less disturbing if the sticker is not perfectly outlined with the tray. For the same reason, it is not chosen to use any shape on the graphic design of the tray that continuous in the sticker. Figure 18 shows the sticker I combination wit the tray.

Figure 17: The sticker design

Figure 18: The graphic design of the tray and the sticker together

Food labelling and the law

The law prescribes that certain information must be available on packed foods in a font size that has a minimum of 1.5 mm. These are:

- Product description
- Ingredients + allergens
- Name and address producer
- Nutrition value
- Weight
- Expiring date
- If packed under protected atmosphere

For retailers is helpful to add a barcode.

To save material, it is chosen to put all information on one sticker, which causes it to be placed on the front of the packaging (since the ticker also needs to cover the sides of the wrap)
A part of this sticker is hidden behind a baffle, but there are so many ingredients that not all (ugly) information can be hidden behind the baffle. The sticker can also not be placed too high on the packaging, since the filling of the wrap must stay visible.

To keep the appearance attractive, it is chosen to use a low contrast between the background and the letters which makes the information less noticeable.

Durability

In the FMCG industry, products come, disappear and change on a very fast pace*. Products could change even every few weeks. This holds especially for fresh products for on-the-go, that often change with the season. In order to let the display make the smallest possible environmental impact, it needs to be designed to have a relative short lifetime, since a more durable design is a waste of resources if it needs to be replaced very often. Another option is to design a durable display that could be customized, but it provides less freedom in terms of the food product's shape change.

The tray is designed to last a full month. After this month the tray can be replaced by the same one, or by an updated design from the producer. By using a new tray, cleaning cost are reduced to a minimum, since. 1) Cleaning a tray like this will take much more effort than cleaning the flat surface of a shelf since there are a lot of corners, replacing it every month will make cleaning unnecessary during its lifetime. 2) the shelf will be less dirty since the tray covers the shelf.

Assuming the tray is refilled one time every day o the month, the baffles need to bend 60+ times. 1 time every day when they are filled, and one time when a consumer takes the wrap out + Some consumers will take out a wrap to look at it and put it back without buying it. → assuming a total of 100 bends a month for refilling ones a day. The cardboard needs to bend back every time to a vertical position.

It is also possible that the tray is refilled more often than ones a day. When demand is higher, there is usually more shelf space for the product, which makes it unlikely that that the tray is refilled for a lot more times a day. When demands becomes super high, the tray can also be replaced earlier than at the end of the month when the trays become dirty or start looking worn out. This will make no difference for the saved amount of material per wrap, since there are also more wraps sold in this case.

*For example: AH to go sells 1000 different products of which around 300 are new products every year (of which are 80 from their own house brand)

Testing the 'bending-back ability'

The cardboard baffle should bend back to its original position every time. By means of explorative research, the design is tested on the amount of times they will bend back before fatigue starts.

A standards tray holds 90 wraps in a lifetime. One compartment holds 30 wraps in lifetime. If a wrap at the back it places or taken, all baffles in front of this wrap will bend. The front baffle will bend 90 times for placing wraps and 90 times for picking a wrap. Some customers will take a wrap and place it back without buying. It results in an estimation of 200 bends in a lifetime for the front baffle.

A test is performed with 2 prototypes made of corrugated 1.5 mm cardboard and solid 1 mm cardboard respectively, by bending the front baffle manually to a horizontal position and releasing it again. In the original position, the lower corner of the bended side of the baffle is touching the ground plate. A margin of one millimetre is allowed. Before testing, both prototypes are placed in a fridge for 8 hours to mimic the more moist environment.

In a test with a prototype made of 1.5 mm thick waved cardboard, after 339 times of bending, the cardboard did not return to its original position (Figure 180). months in terms of baffle return. Since cardboard will become dirty/dusty and will start to look worn out after some time, it is advised to replace the cardboard anyway after one month.

In a test with a prototype made of 1 mm thick solid cardboard, only after 425 times of bending the baffle did not go back to its original position.

Since the lighter and better looking 1 mm solid cardboard performed better in the test, this material is chosen for the final design.

Figure 180: At the beginning of the test (left) the front baffle returned to its original position. At the end of the test the front baffle did not fully return to its original position anymore. (right)

Production method

1. The two cardboard parts can be printed in a continuous process from big roles of cardboard.
2. The glue could be applied by a turning cylindrical shaped stamp just like the ink is applied.
3. The shapes of the two cardboard pieces can be punched out of the cardboard. During this punch movement, folding lines can be created for easy folding of the cardboard in the right places by store employees. Only a small amount of cardboard will be grinded for recycling, since the design is mostly rectangular. Only the cut outs that create the smooth round shape are lost (Figure 19)
   It is possible leave these parts in the tray to be removed by a store employee when placing the tray on a shelf. But recycling them immediately at the factory secures that these parts will actually be recycled.
4. The last step is combining the two parts. Outlining is very important. When the cut outs are not removed, this will be easier since stacking two rectangles with the same width can be done with simple equipment. When the cut outs are removed the outlining becomes a bit more complicated.

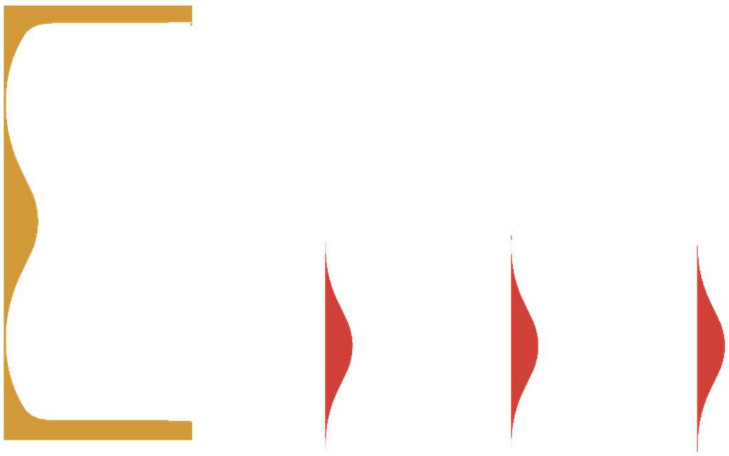


Figure 19: orange: cut outs ground plate red: cut outs upper plate

Paper/material savings

The cardboard cup used by Qizini weighs 8,0 grams. The Qizini wraps are smaller than most other brands, weighing only 170 grams. Most other brands sell bigger wraps and use a bigger carboard cup that weighs around 10 grams.

The designed tray weighs 25.9 grams. By using the tray instead of a cup, an extra sticker needs to be added to the Qizini wraps. A lot of other brands use a packaging design that already uses a sticker on the outside of the plastic. This calculation is done for the specific Qizini wrap packaging. If this concept is applied on other brands the savings will be even more since their cardboard cups are heavier. The added sticker(s) weigh approximately 1,0 gram together. So, 7,0 grams per wrap can be saved on the disposable packaging.

The tray can hold 90 wraps in a ;ifetime. 7*90= 630 gram of cardboard is saved. The tray weighs 25.9 grams, so netto 604.1 gram cardboard per tray is saved every month. Spread over the 90 sold sandwiches makes 6.7 grams saved per wrap.

Qizini was not willing to provide any information to calculate the saved material per year if the concept is applied on their wraps. An article in Distrifood stated that Qizini is producing more than a million products a week (Distrifood , 2015). Qizini's website show they sell 12 different products under their own brand (3 wraps, 3 panini and 6 sandwiches).

To make an estimation, it is assumed the same amount is produced of every product: This results in a production of 0,25 million wraps per week. Multiplying this with the saved amount of material per wrap gives:

6.7 gram saved per wrap = 1.6 ton saved every week = 7.1 ton saved a month = 8.6 ton cardboard saved a year at Qizini

The cardboard from the cups could not be recycled since it has a greasy coating to withstand the moist from the food. The wrap itself can also dirt the cardboard which makes it unsuitable for recycling. The new tray can be recycled since it has no coating and makes no contact with the food.

The wraps without a cardboard cup will fit in a slightly smaller transport box. This will save extra cardboard + space during transportation which could lead to more CO2 savings.

Environmental impact

The saving of the cardboard cups and replacing them by the new tray has effect on the environment in three of the five defined impact categories:

- **Depletion of resources**
  The paper of the cups could have been made out of recycled paper, but the coating and possible food stains on the cups makes it impossible to recycle again. If it was possible, the likeliness of a consumer separating the cardboard part from the plastic and throwing both in the right bin is very small. The new packaging design can be dropped in the plastic recycle bin, the glue and paper sticker cause no harm to the

plastic recycling process The new cardboard tray can be disposed by the retailer in the paper recycling bin. It is a common habit for companies in the Netherland to separate their paper waste stream. The ink and glue cause no harm to the recycling process.

- **Non-biodegradable litter**
  For this project, only the cardboard part is taken into account in the material saving calculations. The possible plastic savings, by using a smaller plastic wrap without te need of having a cardboard cup inside, could have a positive effect on eventually realising less kg of plastic in the sea, but this is seen as negligible positive contribution to the environment.
- **Adding to global warming**
  By saving carboard, a lot of energy and greenhouse gas emissions are saved. CO2 equivalent of cardboard is 660 per kg. This results in an estimated saving of 5.68 million CO2 equivalent a year at the Qizini factory. In comparison, that is the CO2 equivalent of more than 405 persons living in the Netherlands for a whole year (CBS 2018).

Costs estimations

To give an estimation of the saved material costs, the following assumptions are used:

- The cardboard cups cost 3 cents each
- The new designed tray, replacing 90 cardboard cups, costs 10 cents.

These assumptions are based on observations of prices in web shops selling similar products.

Per tray, 180 cents can be saved on carboard cups, while 10 cents are used for the tray. This results in a saving of 170 cents for every 90 wraps. Using the estimates for the amount of produced wraps at Qizini, this results in 0,23 million euros saved every year on material.

Transport and logistics become slightly more complicated since the trays need to be able to be bought/provided separate from the wraps.
Changing the packaging line to work smoothly without cardboard cups comes with start-up costs as well.
If retailers need to adjust the tray to fit on their shelf, to hold for example 4 wraps, they need to use 2 trays. Which reduces the saving per wrap. It is also possible that retailers like to stock extra trays, just in case they get dirty or anything else happens that makes it needed to replace the tray earlier.

Design verification by shop Employee interview

To see if the design is successful in replacing the presentation function of the cardboard cup with a tray, extensive user tests will be executed as described in appendix H. A small verification test of the design from a retailers perspective is done by interviewing a shop employee. As this person is experienced with the original wrap packaging design in a store context. The goal of this qualitative research, it is to verify it is easily understood how the tray should be unfolded as well as no main problems in handling with the design are overlooked.

Approach

A Wrap selling shop is visited. The employee responsible for filling the wrap-shelf is asked to participate in a small interview.

First, the purpose of the new, more sustainable packaging design is explained.

Then the tray is given to the employee in the folded flat position. The employee is asked to open up the design so it can hold 3 wraps.

The following questions are used as a guideline in the interview:

- Do you see any problems with using this design?
- How do you think about filling the individual places instead of a flat shelf?
- How many times a day do you refill the wraps?
- How many wraps are sold every day in this location?
- AIs there anything else you think about, concerning the workability of this tray?

After the interview, the amount of wraps the shell gives space to per flavour is counted.

Results

The wrap selling store: Spar University, is visited. The employee responsible for filling the wrap shelf participated in the interview.

The employee opened the tray in the correct way without trouble. He didn't see any problems with filling the tray on the shelfs, but he was wondering of the cardboard would hold in the moist environment of the cooling.

The shelfs are filled shelfs 2 times a day, in the morning and in the afternoon when the truck with new supplies comes in. This location sells 60 wraps a week, all flavours together. They sell 3 different flavours, resulting in selling on average 3 wraps per flavour per day.

The shelf gives space to 8 wraps per flavour, so the shelf in this store does not need to be refilled completely every day.

In this store, the wraps are stacked in two rows of 4 wraps for each flavour, which means that 4 trays of the new design would be needed to place the wraps in the same position. The employee first mentioned the tray would not be suitable for this store, since it can only hold 3 wraps. After explaining the tray could be adjusted to hold 4 wraps the fuction was clear for the employee. He noted that, with rows of 4 wraps, consisting of two tray parts, the trays could be used for faster refilling by the 'first in first out' (FIFO) principle. The entire tray part, holding two wraps from the back, could be moved, instead of the individual wraps.

Discussion -- the created test design

The goal of the design is to provide a realistic scenario to test if the *presentation shifting concept* has potential. Although the created test design could be improved by further iterations and more research would need to be done if the design would actually be implemented in a large scale scenario like the Qizini factory. The design is thought out detailed enough for the test purpose.

Although packaging the wraps in a foil by hand without using a cardboard cup went without problems during testing and prototyping, it could be that within a highly optimised wrap production line, the cup does provide a function in keeping the wraps together in their wrapped position while being packed in an automatic flow-wrap machine. Unfortunately, contacted wrap producing companies did not want to cooperate in providing access to the packaging area of the factory to be able to observe the process.

The tray might be moving a bit while taking out the last wrap since it is very light. This depends on the shelf's material and size. A sticky coating on (a part of) the bottom could prevent this, but it will add to production costs and might not be suitable to use on all shelf's materials. Another suggestion is to provide 'fixating putty', like sold to hang posters, to the retailers that can be used if needed.

The cardboard folds for the baffles in this design are made by small incisions in the cardboard; a method that is commonly used in cardboard food packaging design. The way the folds are made does have an influence on the performance and durability. For this project, it was not needed to dive deeper in this topic since the way it is folded has an negligible impact on the price, environmental impact and production techniques. The current folding method is working quite well, but with more research, maybe an even thinner plate of cardboard can be used while maintaining the same strength and durability of the fold.

Tearing of some part of the tray to make it fit on the shelf was not a part of the verification test with store employees. The optimisation of the tear-off line is not optimised for the same reason as mentioned above for the cardboard bends of the flap.

The durability is tested by explorative research. In the single time the design is tested for the amount of times it bends back to its original position, the value was far above the minimum amount needed. For the purpose of creating a realistic test design, this

explorative test was sufficient. If the design would actually be implemented, more profound research will be necessary to see which cardboard type is most suitable.

Cost savings are hard to estimate, at least it can be said some money is saved on the packaging. The cost that come with switching to the new design are only one-off, so in the return of investment will come after some time, the duration depends on the actual saved costs. Even when the net savings will be negligible, it is positive the new design will at least not come with a lot of extra costs.

Exact amounts of the reduction of the environmental impact in the different impact categories are also hard to estimate. In the estimated scenario the possible weight savings for the plastic are not taken into account, calculations on environmental impact savings will be more correct and possibly more positive if this is taken into account. The same hold for the savings on transport and transport box material since the wraps take up less space without the cardboard cup.

H. Verifying the concept's potential by qualitative user research

The following verifying tests provide insights about the consumer's perception and preferences concerning the new packaging design compared to the original Qizini design by means of qualitative research.

The test design is used to collect qualitative insights about the solution concept. The timeframe of the project does not allow (quantitative) tests that can prove the concept is performing as intended. The goal is to show the concepts potential by the insights gained.

For the initial design, insights are gathered in two different ways: by means of a give-away test and a focus group. The results are used for improvement of the test design. For the next iteration, insights are gathered by means of a new give-away test, including small interviews with the participants and a focus group. A discussion on these tests and outcomes is provided at the end of this appendix.

Approach Give away test 1

During a presentation about an unrelated topic, free wraps are offered to the audience. The wraps are standing on a table at the entrance of the presentation room. A sign next to the wraps tells them they can take a wrap if they like. People can take a wrap on their way in, or after the presentation on their way out.

Only one flavour (chicken tandoori) is be available and there is a choice between 3 types of packaging design:

- 3x The original Qizini design
- 3x The new design with wraps in a tray
- 3x The new wrap design without a tray

The wraps without a tray are there to see if the tray presentation performs better than wraps without a tray.

Results give away test 1

The audience was mixed in gender, age and educational background. All people in de audience knew the speaker personally, which created a respectful attitude from the audience towards the provided wraps. They handled the wraps with care.

The order in which the wraps are taken is shown in Figure 20.

1	**New design without tray**
2	**Original design**
3	**Original design**
4	**New design**
5	**New design**
6	**New design**
7	**New design without tray**
-	**Original design + New design without tray left over**

Figure 20: The order in which the different wrap packaging design are taken by the participants

Approach Focus group 1

The audience needed to kill some time after the graduation talk till the grade of the presenter was revealed.
Right after the talk, people where asked if they would like to spend some time by volunteering in a focus group to talk about the wraps.

3 participants volunteered to be in the focus group. They filled in a short 5 question survey about age, gender, education level and buying behaviour and signed an informed consent form to allow a sound recording of the whole conversation.

The rest of the audience left the room, the 3 participants and the conversation leader sit together on a table with the 3 types of wrap packaging in front of them.

The following questions where used as a guideline for the conversation:

Which wrap is most fresh?

Which wrap is most attractive?

How much would you pay for each wrap?

Which one would you have chosen/ have you chosen?

Which packaging design is most sustainable

Now the conversation leader shows which design is new and explains the goal of the new design

Does this new information changes your opinion about the packaging designs?

Which one would you probably buy now?

Does the new information change how much you would pay for the wrap?

On beforehand no information is provided about the packaging designs, the participants is told that it is encouraged to react on each other's opinion.
During the conversation, the conversation leader uses no descriptions to talk about the different packaging designs, but only points to them (this one) to prevent a bias.

Results focus group 1

All participants are high educated, two are male, one is female. All participants buy wraps sometimes and prefer a wrap above a sandwich.
Two participants are in the age group 18-25 and one participant is in the age group 26-35

One participant had taken a wrap before the presentation. His choice was a wrap in the original Qizini packaging design

When asked which wrap is most fresh, the participants started looking for an expiring date and if the lettuce was still green. The design of the packaging did not seem to matter for their opinion about freshness, although they think the original packaging presents the food more tasty. While evaluating the freshness, they started talking about brands. They all say they don't know this brand, but if they know and trust a brand, they think that will be an indication for how fresh the wrap is, without looking at the expiring date.

They would all pay most for the wrap in the original packaging design. They think the packaging is more attractive and they say it takes more effort to put a wrap in a cardboard cup by the producer, which makes it more expensive. They used words like cheap, skimpy, more practical (in a negative way, as opposite of fancy) to describe the other two wraps. There is no difference in what they would pay for the wrap in the tray or the wrap without a tray. They perceive them as the same wrap, since they are only getting the wrap and not the tray.

schraal, skeer goedkoop, goedkoop presenteren minder vers

They do notice that the new design uses less material. Which is indicated as more sustainable by one person, but as a cheap feature by the others. When literally ask asked which design is most sustainable two persons point out the new design without a tray, while one person thinks none of them is sustainable since they all use plastic.

After explaining the purpose of the new design, people were asked if it changed their opinion. One person would still buy the old packaging, he also believes it is easier to eat the wrap from that packaging. The others do not agree since they have a good experience with eating fresh snacks like croissants from the Jumbo out of a plastic bag and it works just fine they say. They would buy the more sustainable packaging.

The person that ate the wrap during the presentation noted that he wasn't aware which flavour he was eating since he didn't read the packaging. He just looked at the filling to see if he liked it. The others agreed that they also often didn't read the packaging at all and just looked at the product inside before buying.

Discussion -- giveaway test and focus group 1

The give-away results showed there was no clear winner between the 3 wraps and there is no type of packaging clearly the least popular.

Only 9 wraps were presented, which means that taking away even a single wrap changes the view of the table with wraps already significantly. The fact that other wraps from a certain packaging are already taken by the person before, could influence the choice of the next person.

The order of the wraps on the table could also have an effect on which wrap is taken by a person.

It is not possible to know why people made a certain decision. In this scenario, people do not necessarily take the same wrap packaging as they would buy in a store. Since the wraps were offered for free in a family/friend context, people could have been polite by taking the least attractive packaging design as well.

The wraps are presented on a table, not in a cooled store shelf environment. People could for example first take the 'loose' wraps before taking a wrap in a full stand. As soon as one wrap from the new design was taken out the tray, the next two person choose a wrap from the new design as well. At this moment, there was only one wrap left with the original design. It could have been that people actually liked this last one the best, but did not take it out of politeness, since it was the last one.

The graphic design of the new tray is made in the same style as de original design, but due printer anomalies, the colours appeared a bit darker in the prototype. Colours can have an influence on consumers interpretation of a product and thereby influencing the test results.

The new design is clearly not outperforming the original design. The results from the giveaway test did not indicate any preference.

The participants in the focus group experienced the new design as cheap and less fancy with less quality, but didn't thought it was less fresh. They noted that they often do not read the packaging and just buy by the looks of a products. This indicates that it is important to put a wrap in an upright position to make the filling visible.

Another valuable inside is that people perceive the product as to be only the part they take away from the store (food + premiere packaging), not the tray around it that they have to leave in the store (secondary packaging).

So it is important to make the food in the primary packaging, which people can take out of the store, to look as attractive as possible. The tray will serve a function by holding the wraps in a upright position to provide a good view on the filling and providing branding opportunities.

Iteration based on results

To gain insight on how the design is received by consumers after the last iteration, an adjusted give away test and a second focus group is organised. The giveaway test is complemented with a small interview after the choice is made by every participant to gain more insight about their considerations for their choice.
The focus group is executed with new participants to see if this group react differently on the design after the last iteration than the first focus group did before.

Approach Give away test 2 + interviews

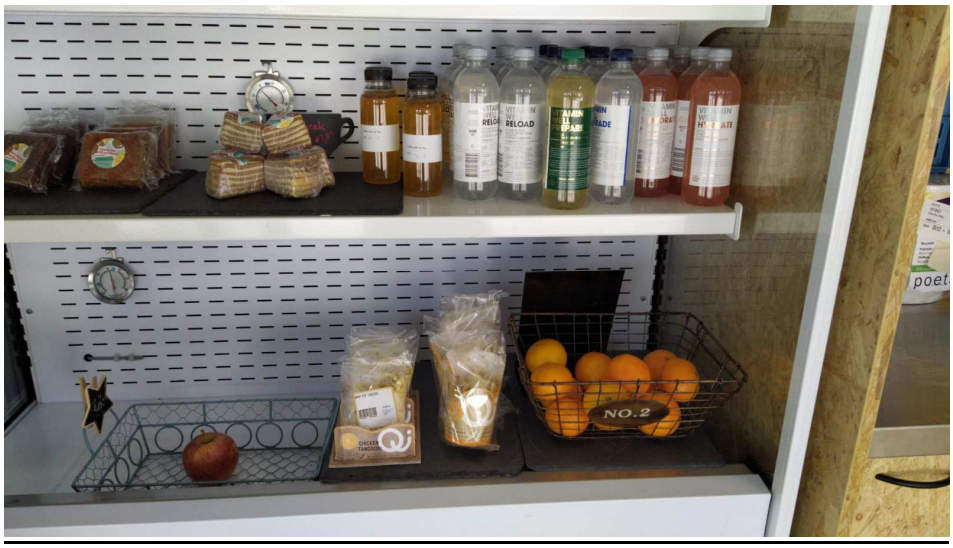


Figure XX: Wraps in two different packaging designs in the cooling display of the Coffee-Star

For testing the design after the last iteration, de Coffee-star cooperated by putting the wraps in their cooling display.
The coffee-star sells next to coffee also freshly baked products like American cookies, croissants, focaccia (fancy sandwich) and panini (heated sandwiches from the grill), cold drinks, snacks and fruit. The Coffee-star does not sell wrap and did not sell them in the past.

People nearby the coffee-star are asked if they want to participate in a research by answering a few questions. They are getting a voucher for a free wrap at the coffee-star as a reward.

To hide the actual purpose of the research, the participants are asked a few question about how they experience the TU delft campus. This topic is chosen since it has nothing to do with food/wraps, sustainability or packaging design. As a reward they receive the voucher. It is told that it is only valid today and that the coffee-star is almost out of wraps, so they better get it straight away.

The interviewer walks in another direction first, to make it seem that she is spotting the next person to ask questions about the campus.

The participant walks to the coffee-Star and gets a wrap from the cooling display.

After the participant made his/her final decision about which wrap to take and started walking to the coffee-Star's paying desk to hand in the voucher, the interviewer walks to the participant, revealing that the actual test was about the wraps. They are asked again if they are willing to answer a few questions, this time about the wrap packaging (informed consent). Together they walk back a few steps to the cooling display, so the participant is able to see both packaging designs.

The small interviews are done in a relaxed conversation style to collect as much information as possible in short time. The following questions are used as a guideline:

- Do you remember why you choose for this packaging design, and not for the other one?
- Which one looks more fresh?
- Which one is bigger?
- How much would you pay for the wraps in both packagings?
- Anything else you notice or want to tell about these two packaging designs?

In the result section the terms *original design* and *new design* are used for readability. During the interviews, the different designs are only pointed to and not described in any way by the interviewer to prevent a bias.

After the conversation, participants are asked to fill in a form with 5 questions asking for:

- Gender
- Age group
- Education level
- Frequency of buying wraps on the go
- Preference for wraps or sandwiches

There was only one single flavour available. After every interview, the wraps where refilled to at least 2 of every packaging type.

Results give away test 2 + interviews

8 participants were interviewed about the campus of which 7 went to the coffee-star to get a wrap and where interviewed about the packaging.

All participant are high educated, 6 participant are in the 18-25 years old age group and 1 participant is within the 26-35 years old group.
There was one female participant and the rest are male. One participant never buys wraps on the go. 4 participants buy wraps on the go sometimes, and two participants rarely.

Participant number	Education level	gender	Buying frequency	Age group	Food preference	Packaging choice
1	WO	M	sometimes	18-25	wrap	New design
2	WO	M	never	18-25	sandwich	Original
3	WO	M	rarely	18-25	sandwich	New design
4	WO	F	sometimes	18-25	wrap	New design
5	WO	M	rarely	26-35	sandwich	New design
6	WO	M	sometimes	18-25	wrap	New design
7	WO	M	sometimes	18-25	sandwich	New design
8	-	F	-	-	-	-

All participants chose for the new design, except for participant 2. This participant was interviewed about the campus together with another participant (8). He went inside to get 2 wraps for both of them while the other participant stayed outside.

Why choosing the original design

The participant choose for the original design since he thought there were 2 wraps in this packaging design and only one wrap in the other packaging design. (there were 2 from both of them, so he didn't see it correctly). He wanted to get 2 of the same wraps. He thought both packaging look equally fresh. The original design was better visible in his opinion, but the new one looks more sustainable.

"All participants chose for the new design, except for one participant."

Why choosing the new design

The reasons for people to choose for the new design are divers.
Most people had to think a bit before answering why they chose this design. One participant could not give any reason.

Other participants used arguments like: This one looks bigger, this one looks better tasting, this packaging uses less material, so it is more sustainable, this one is less old, so more fresh, this one was in a stand.

Impression comparison

After asking for the reason to pick a specific packaging design, a conversation was started about their impression on both designs.
Some participants that did not give a sustainability argument to choose for the new design did notice the design was more sustainable.

The wrap in the new design was seen as equally fresh ore more fresh than the original design. None of the participant thought that the wrap in the original packaging looked more fresh. The wraps in the new design where mentioned by some participants to be less old, but equally fresh.

Some participants indicated that the wrap in the new design looked like it was not machine made. These participants were also asked how much they would pay for each design. Being handmade was a reason for some participants to pay less for the wrap and for some participants to pay more for the wrap. Other participants didn't use handmade as an argument for a higher price, but thought the original was more expensive since more packaging material was used. Three participant who choose for the new design noted that the original design looks more fancy.

Most participants thought the wraps had the same size, one participant thought the wrap in the new packaging was bigger and one participant thought the wrap in the original packaging was bigger.

Conclusions

Within the small test group the new packaging design was most popular for different reasons. The packaging itself is not more fancy or better looking, but people interpret the wrap itself as a better product for different reasons like: more fresh, bigger, better tasting. Some people choose for the new design because it uses less material and is more sustainable.

Approach Focus group 2

the 3 participants and the conversation leader sit together on a table with 2 types of wrap packaging in front of them.

The following questions where used as a guideline for the conversation:

- Which wrap is most fresh?
- Which wrap is most attractive?
- How much would you pay for each wrap?
- Which one would you have chosen/ have you chosen?
- Which packaging design is most sustainable
- **Now the conversation leader shows which design is new and explains the goal of the new design**
- Does this new information changes your opinion about the packaging designs?
- Which one would you probably buy now?
- Does the new information change how much you would pay for the wrap?

On beforehand no information is provided about the packaging designs, the participants is told that it is encouraged to react on each other's opinion.
During the conversation, the conversation leader uses no descriptions to talk about the different packaging designs, but only points to them (this one) to prevent a bias.

Results focus group 2

All 3 participant are in the age group of 18-25 years. Two are female and one is male. Two of them buy wraps rarely, One of them sometimes. They all prefer wraps above sandwiches. When asking about which design I more fresh, the new design was describes as more fresh, freshly made, packed this day and thereby more fresh.

When describing the two different packaging designs, people only described the packaging without the tray. The tray was not included in their description. The new design was described as square shaped, minimal, simplistic, less packaging.

The old design is described as more fancy, creating a better eating experience.

One person would pay more for the old design than for the new design. There was some discussion about it in the group, but at the end the others agreed with the first person.

The group recognised less material was used in the new design when asked which one was more sustainable. A participant remarked that he would not think that long about his decision in a store context and would not notice this design is more sustainable.

After telling about the intentions of the new design to save material, all participants would buy the more sustainable packaging.

A participant noted that if all old packagings were displaced by the new design, that she would get used to it very quickly and that is wouldn't influence their buying behaviour. The others agreed with her.

Discussion -- giveaway test 2 + interview and focus group 2

Most participants in the giveaway test + interview had to think for a few seconds before answering why they chose this packaging and not the other. Studies showed that people are very good in finding reasons for their unconscious decisions afterwards, the so called *post-purchase rationalization.*
Except for one man who couldn't think for a reason to justify his choice, all participants were all very positive about the design they had chosen. It could be that a *choice-supportive bias* effect makes people more enthusiastic about their choice.

If this is the case, the reasons found in this qualitative research for consumers to choose for a certain packaging could play a far smaller role in their decision than seems from the results since the actual last decision is made unconsciously by most people in food shopping situation.

The new packaging was more popular in this small test group when people made a choice without knowing that their choice was part of the research. If the same selection-test was done with a much bigger test group, the results could say more about peoples unconscious preferences.

Most participants were familiar with wraps and potential future customers since they bought wraps like these in the past, which makes them the right target audience for this test. The test location was situated at the TU Delft campus, which caused most participants to have an educated background. Arguments to choose for a certain packaging could be different for people with a different education background. To say more about the entire wrap buying population, the test should be repeated with participants with a bigger variety in education backgrounds.

Although the design before and after the last iteration is tested in a slightly different way, it seems that the extra iteration made the design more successful. The first focus group was fairly negative about the initial design, while after the iteration, except for one person, all participant choose for the new design over the old design in the giveaway test.

The goal of the research is to find out if the presentation function of a disposable packaging design could be shifted to a reusable tray. The remarks from the focus group showed that these people perceive the product as to be as only the part they take away from the store (food + premiere packaging), not the tray around it that they have to leave in the store (secondary packaging). The results from the second focus group confirmed this finding. If the found statement is true for the target group, than the tray around the packaging would not make any difference in terms of making the product look more luxurious and will only

fulfil the functions of placing the wraps in an upright position and providing marketing opportunities. It means the tray cannot replace the full presentation function of the original cardboard cup.

The last iteration on the design made the new design more successful. But in fact, after the last iteration, it was not a design anymore that simply replaced the presentation function from the disposable part by a reusable part. The new design is tricking people into thinking the product is more fresh. It could be argued this is not involving replacing the old presentation function, but it involves making good presentation less necessary since people think they buy a different kind of product. The concepts are shown in Figure 20. The results from the test indicate that this approach might actually work quite well.

Stores that do have a fresh department may not want to mislead people in this way, while smaller shops that do not have a fresh department might be willing to use the looks of fresh department sticker design to make people buy their products.

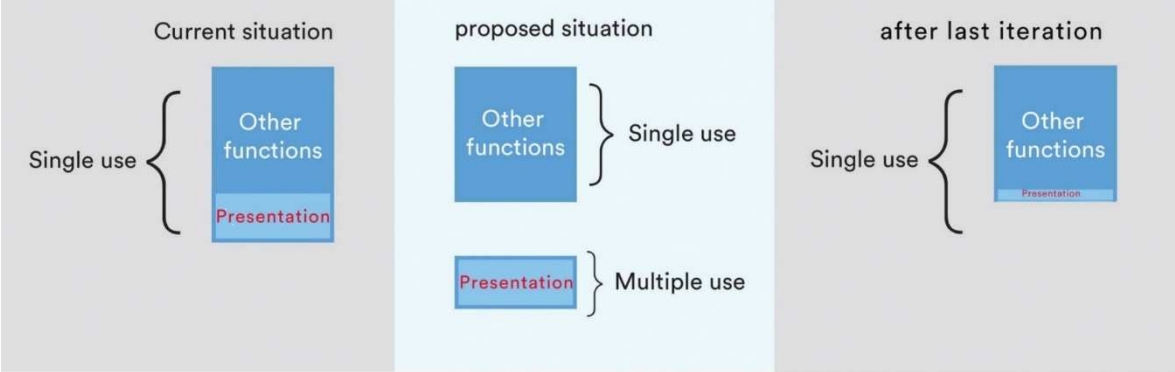


Figure 20: The last iteration did not replace the presentation function, but just reduced the need of a fancy presentation by tricking people into thinking they buy a product that is freshly made on location

Over all, the results from the giveaway test 2 + interviews and focus group 2 suggested the test packaging design, after the last iteration, is preferred over the original Qizini packaging design. Thereby the concepts potential has shown.

Research ethics

All research involving human participants is performed with informed consent following the GDPR and Human Research Ethics guidelines.

I. Original project proposal as approved by the graduation committee

One of the requirements for graduation at the TU Delft, as stated in the IDE graduation manual, is to include the original project proposal. The following pages present the original project proposal as approved by the graduation committee.