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## Strategies for food longevity

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### Abstract

Although food has been circular by nature, the current food supply chain has turned into an unfortunate linear system. The challenges of transitioning towards a sustainable food eco-system requires radical changes and new perspectives, where things are done differently. Starting with related work in the field of design for product longevity, the current work explores the role of design in developing food systems on eco-systemic level that work as efficient as possible, and create a world without waste. Eight local initiatives in Rotterdam have been studied. From the lessons learned, nine strategies were formulated. Although these strategies seem to work well and are promising starting points for innovation, it remains difficult to build sustainable business models around these strategies that can be scaled and sustained. Initiatives oftentimes keep struggling with the current system and finding the proper scale for their business. It can be concluded that design promises to play an important role in accelerating this transition towards a circular and future-proof food system.

### Introduction

The way our modern society has developed into a world of unlimited growth has no future; we would need 1.6 earths to keep supporting humanity (Global Footprint Network, 2016). One of the big societal challenges is creating a food system that will fit the human needs within the planet's possibilities. Such a food system will need a "fundamental transformation" (World Economic Forum, 2017). Obviously, food wastage is a problem, but also the way food is consumed is a big challenge. In fact, only 24% of the impact that consumers have on the environment, is directly visible, which makes it difficult for consumers to make more deliberate choices (Porcelijn, 2016). These challenges demand new ways of innovation – a shift in thinking, doing, and organising (Mulder, 2014); we can no longer only optimise current systems, but we need to let go of existing paradigms and actively look for radical alternatives that support the transition towards a more sustainable future.

Being aware of the need to radically change the existing food system, more and more initiatives are emerging that let people take greater control and responsibility of their own lives. These emerging initiatives are, for example, experimenting with sustainable lifestyles and disruptive businesses aiming to demonstrate how society can be radically changed (Rotmans, 2014). Oftentimes, these initiatives have a pragmatic character and start with fulfilling local needs by offering products and/or services to the local community. As their ultimate goal is to change current systems, they usually depend on the government, either for permission or support (Igalla & Van Meerkamp,

2015). Even though, emerging initiatives are lauded by many of their users and stakeholders, the question remains whether these initiatives can and will have a long-lasting impact (Igalla & Van Meerkamp, 2017).

In the current work, we explore the value of design in sustaining emerging initiatives and their impact on societal change, and focus on the city of Rotterdam. Rotterdam is a city where many initiatives are emerging to make the city resilient for the future. There is a culture open to change. Moreover, Rotterdam has open space and has a municipality willing to support these initiatives (Mulder, 2015; Fast co-exist, 2016). Particularly, we focus on initiatives across the food chain that challenge and improve the food system on a local scale. In the related work, design approaches in the context of product longevity and sustainable transitions are described and the role of food in this context is explained. Thereafter, the method is presented, and results are discussed. To conclude, the nine lessons learned from these food initiatives will be discussed, and what this means for the role of design.

### Related work

In an elaborate investigation on the challenges of waste, RSA (2013, 2016) discusses various opportunities of a circular economy through the lens of design. Figure 1 shows the resulting four design models.

*Design for product longevity* is at the heart of the proposed design strategies. This strategy refers to designing products in such a way that materials and energy going



Figure 1. The four circular design models (retrieved from RSA, 2013).

into a product, are used to a maximum. In other words, products are designed to last, and after product use they can be passed on to another user (RSA, 2013). Figure 1 also shows that this design strategy is the loop that is closest to the user, and therefore most preferred in circular economy thinking (Charter & Keiller, 2014; RSA, 2016). When this is not possible or relevant, one can move on to the next loop (RSA, 2016).

Creating products that fit in a circular model involves many strategic decisions, e.g., choosing product life scenarios and business models (Bakker, Wang, Huisman, & Den Hollander, 2013). Differently put, not only functional aspects are important, but also the emotional, aesthetic, and financial aspects of the design. However, in keeping with Porter and Kramer (2011) companies should not only profit from a product, but they should also look at how to create 'shared value', which means creating not only economical value for the company, but also a societal value.

## Towards food longevity

After all, in terms of product longevity, it might seem strange to define food as a product. Food is not produced for (long-term) usage, but to consume. As a matter of fact, food is circular by nature, and already part of a circular ecosystem; it grows, it is eaten, and then the waste is returned to the ecosystem, but in practice the food supply chain is linear instead.

About one third of the edible parts of food is being wasted globally (Gustavsson, Cederberg, Sonesson, Otterdijk, & Meybeck, 2011). Even worse, a lot of that does not end up in the system anymore, but on a landfill, which is a huge waste of energy and resources. Hence, it is necessary to design the food system in such a way that the materials and energy going into producing the food are used as efficient as possible. Such a change from product longevity to food longevity, however, requires a transformation on system-level, and requires collaboration between multiple stakeholders, from both within and outside the traditional

food system players (World Economic Forum, 2017).

The current work, therefore, deliberately refers to *food longevity* instead of product longevity, and explores the role of design in developing food systems on eco-systemic level that work as efficient as possible, and creating a world without waste; also, referred to as the blue economy (Pauli, 2017).

## Case study

As said before initiatives located in Rotterdam are subject of the current study to illustrate the welcomed transition. Eight initiatives were selected on their unique perspective and positioning along the food supply chain from production to consumption and waste management (Figure 2). Seven of them are an entrepreneurship/start-up, and one is a platform-based organisation. A combination of desk-research (articles in newspapers and magazines) and in-depth semi-structured interviews (with Rechtstreeks and Happy Shrimp) has been used to study their strategies to change the food system and how their initial ambitions and values might have changed along their growth process. To evaluate the research findings regarding their validity, these were sent to the initiatives to check whether they can relate to the results and give them the possibility to give feedback. Next, findings were analysed to distil lessons learned, which were clustered. The nine resulting strategies are described in the results section. The eight initiatives participating in the current study are briefly introduced below.

**Rotterzwam** is a company located in the former swimming pool 'Tropicana' in Rotterdam. Being part of the city farming movement, they collect coffee grounds (the residue of coffee) from local companies and grow mushrooms on it. After two to four harvests of mushrooms the coffee grounds have become very fertile and can be used as a fertilizer on farming grounds. This is in keeping with one of the ideas developed by Pauli (2017) to establish a blue economy. By combining different ecosystems (coffee beans and mushrooms) a new system arises with (almost) no waste. Next to this, they sell a DIY mushroom grow kit, give workshops, and spread their knowledge open-source through webinars.

*Rechtstreek* offers a platform to local farmers (within 50 kilometres from Rotterdam) to sell their products directly to consumers. Consumers can order online and collect their food at a weekly pop-up store, run by local employees of *Rechtstreek*, in their own neighbourhood. Farmers get a fair price for their products.

*Rotterdamse oogst* is a bimonthly market where products from local farmers are sold. Farmers get a fair price for their products. Moreover, they organise many educational activities for children and adults. This is often combined with musical performances or public lectures.

*Kromkommer* 'rescues' vegetables that are being discarded because of their looks (e.g., oddly shaped or not the right

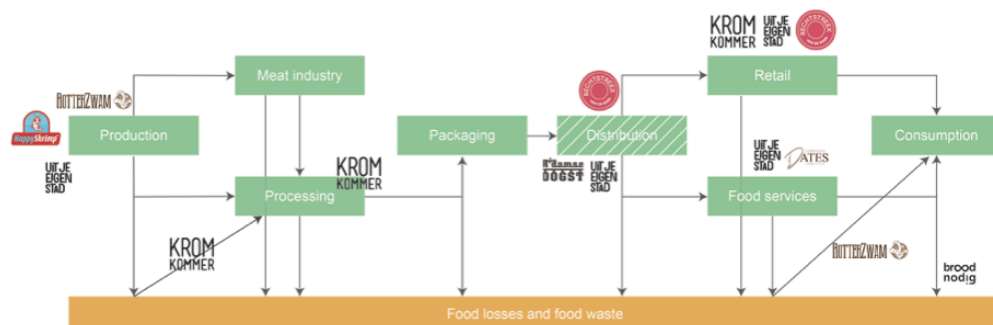


Figure 2. Linear food production chain with local initiatives.

size). From these vegetables, they make veg(etari)an soups, which they sell through other initiatives such as Rechtstreeks and Uit Je Eigen Stad as well as through some super markets and concept stores.

*Happy shrimp* was one of the first initiatives, and unfortunately went bankrupt after a few years. They produced biological tropical shrimps and used waste streams of a nearby power plant. Although the concept worked well, the start-up phase took too long, and returns on investments were not received in time.

*Broodnodig* collects the stale bread in different neighbourhoods in Rotterdam, and uses this to produce biogas. Stale bread is a big problem in Rotterdam, because it is often thrown away on the streets, which causes rat plagues.

*Uit je eigen stad* is a true city farming initiative. They sell products from their own farm, on a self-initiated market and mini stores, and use these products in two restaurants that they run.

*Espresso Dates* is a breakfast- and lunchroom, which uses mainly local products, combined with some Moroccan influences and super food. Most of the food they sell is produced in the neighbourhood. Many different people get together here, because it is at the intersection of different neighbourhoods; from the more expensive ones to social housing.

## Results

From the lessons learned, nine different strategies for food longevity were defined (see Table 1).

The first strategy, as shown in Table 1, is the upcycling of food waste, which refers to trying to turn food waste into a more valuable product than it was before. To illustrate, Kromkommer turns vegetables and fruits, that usually get thrown away, into soups.

A related strategy is using waste streams from other systems, as input for the production process. The Happy Shrimp farm for example used the waste streams of a

nearby power plant as a heat source for their shrimps.

Another strategy is promoting vegetarian/vegan food. Plant-based food often has less impact on the environment than meat.

Local production is oftentimes used as a strategy to make the distribution channels as short as possible. The rationale is that food usually travels large distances before it ends on your plate, which generates a lot of unnecessary CO2 pollution. The current initiatives demonstrate that food can be produced locally as well.

To produce locally, some initiatives make efficient and innovative use of city space. Vacant buildings are re-used for city farming: a former swimming pool turned into a mushroom production facility, and a harbour building turned into a shrimp facility.

By shortening the distribution channels more transparency is created for the consumers. Transparency is another strategy used by the initiatives to show the origin of food. It connects farmers and consumers, and enables buying directly from a farmer. This also creates more possibilities to offer the farmer a fair price. A shorter production chain leaves a bigger percentage for the farmer. At the same time, consumers seem to be willing to pay more, when they know where their money is going. Rechtstreeks is, for example, very transparent about the fact that the farmer receives 57 cents per euro.

Creating a (more) local food system, largely depends on the community that uses the system. Therefore, enhancing (more) social cohesion is an important strategy. Points of sale are often located on a place that is important to the community. Moreover, the initiatives organise many events to involve the community.

Lastly, *education* in which initiatives share their knowledge and ideas acquired overtime is another important part of their business strategy. It not only inspires more people to have an impact, it also appears a welcome source of income.

Discussion and conclusions

The nine strategies described above, seem to be promising starting points for innovating the food system towards a more sustainable and circular system. In general, the initiatives are quite effective to change the way we look at food, by producing locally or more sustainable, creating transparency or awareness around food, and by minimizing or reusing waste.

Most initiatives use a combination of different strategies, combined with a form of tutoring and inspiring others. Interestingly, the initiatives start with a societal need or problem to solve, and while doing this, they also try to find economic value in their ideas. This shows that they often create shared value (Porter & Kramer, 2011) the other way around. Especially the funding in initial years are crucial for the initiatives. Oftentimes, the initiatives are partly funded by crowdfunding, which stresses the value that the products and services have for society.

Although evidence was found that sustainable business models are built around these nine strategies, this is not straightforward. Initiatives frequently indicate how they were struggling to survive. Yet, the biggest struggle bottom-up initiatives encounter, seems to be the current system. Most of the consumers are not (yet) ready to change their behaviour. Comfort and ease are found in the old system, where big supermarkets are the major players. This makes it challenging for local initiatives to stay close to (and propagate) their original values when they are gaining popularity or when they are not getting known by a bigger audience. For customers on the other hand, it is difficult to see which companies are truly transparent and honest, and which are not.

How can initiatives be scaled and sustained to become profitable, while keeping locality as a core strength? Rotterzwam demonstrated a successful scaling strategy by encouraging others in their network to start the same initiative in other cities around the world. However, Rechtstreex, experienced that scaling up by replicating in Utrecht and Eindhoven was not a promising strategy. Consequently, they are focusing again on growing their market and network locally, in Rotterdam. Surprisingly, initiatives also influenced the major players positively. For example, Albert Heijn, one of the largest supermarkets, started their own ‘Buitenbeentjes’ (i.e., oddballs) fruits and vegetables line in 2015, a food longevity strategy that already has been promoted by the initiative Kromkommer in 2012 (Engelen, 2016).

It can be concluded that best practices on a small and local scale, can be adopted by large, traditional players in the system. However, transitioning the entire food system towards a circular system has a long way to go. It requires an approach where food is seen in a broader perspective. Interestingly, the broadening role of design, which crosses traditional boundaries (Brown & Wyatt, 2010; Diehl & Christiaans, 2015; Calabretta, Gemser, & Karpen, 2016), offers great opportunities to accelerate this transition (Transition Design Symposium, 2016).

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		Type of Business	Strategies								
			Upcycling of food waste	Reuse of waste streams	Vegetarian (or vegan)	Local production	Efficient use of city space: city farming	Transparency in food chain	Fair price for farmers	Social cohesion in communities	Education
Initiatives											
Rotterzwam	Entrepreneurship	✓			✓	✓	✓				✓
Rechtstreex	Entrepreneurship					✓		✓	✓	✓	
Rotterdamse Oogst	Platform					✓		✓	✓	✓	✓
Kromkommer	Entrepreneurship	✓			✓				✓		✓
Happy Shrimp	Entrepreneurship			✓		✓	✓				
Broodnodig	Entrepreneurship	✓									✓
Uit Je Eigen Stad	Entrepreneurship			✓			✓				✓
Espresso Dates	Entrepreneurship					✓				✓	

Table 1. The initiatives and nine resulting strategies.

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