

Establishing a Circular Hub for Fruits and Herbs in South Holland

Best practices from theory to establish a successful and
sustainable new venture

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Layman's summary

Sustainability has become a key focus in a lot of industries. One of the big struggles in sustainability in general is waste, and designing waste out of systems has become a key concern. In developed countries, food waste represents a huge obstacle to establishing a sustainable society. People in richer countries are used to a large variety of available foods, and have enough expendable income to afford food going to waste. However, food waste is not limited only to the consumer side. A lot of foods are considered waste much earlier on in the supply chain. Indeed, especially during storage and distribution, foods like fruits and vegetables which are perishable, can easily go bad and become wasted. Furthermore, sometimes foods that are still edible are discarded due to factors like cosmetic issues (e.g. having dark spots on fruit or being the wrong size). This food is often discarded at distribution centres, such as ports. The Port of Rotterdam sees a lot of traffic of food, and a lot of food supply is stored here. It is estimated that every year, in this port alone, around 1 billion kg of edible food becomes waste. Food waste in particular is a complex problem to solve and requires inputs from all sorts of institutions to be tackled. For example, governments can help by implementing regulations to tackle food waste or to incentivise people to waste less. Another route that can be taken to tackle this issues is via establishing new innovative companies. Particularly for food waste at a supply level, there are currently no solutions available in the Netherlands. For this reason, the Circular Hub for Fruits and Herbs is being developed. This Hub will take the role of connecting the fruit and herb surpluses at the Port of Rotterdam with small and medium enterprises. This is necessary because the quantities that are available are too large for one single company to completely take over. By establishing a sorting and packaging chain via the Hub, small companies can have access to these waste streams to include in their businesses. Therefore, the Hub can be a great asset to make the food system in South Holland more sustainable. To make this new company truly sustainable, the operations also need to be run sustainably. For example, part of the vision of the Hub is to employ people from marginalised communities thus contributing to a more independent society. Furthermore, it is important for sustainability to be a core value for the company as well as the people managing it. Having clear core values will also contribute to fostering the right kind of cooperations amongst businesses, which is important as a successful collaborative environment is also vital to ensure sustainable business activities. Lastly, establishing economic viability is crucial for the success of the business. If successful, this

venture can later be expanded to other cities and ports and make a giant impact in the food systems in the Netherlands.

Abstract

Food waste is one of the wicked problems of our time. As sustainable practices become more widespread, new ventures and projects that tackle sustainability are being developed. However, so far they have mostly focused on the consumer market. A significant amount of food waste begins in the early phases of the supply chain, especially at distribution centres such as ports. The Port of Rotterdam has enormous amounts of food waste annually of produce that is rejected due to reasons that do not affect their edibility (e.g. cosmetic). A new venture is being developed to tackle this waste: the Circular Hub for Fruits and Herbs. The Hub aims to connect these large amounts of food waste to small and medium businesses. This paper extracts useful practices for business models for sustainability to create a successful venture that could tackle the food waste issue effectively and contribute to a healthier, more sustainable society.

Introduction: the Circular Hub for Fruits and Herbs

Superorganisms are defined as groups of individual organisms of the same species working synergistically towards a common goal. The common ants are a great example of this: individually, ants are pretty incredible organisms, together however, they can move mountains. Looking at humanity from a superorganism perspective, it is abundantly clear that economic growth had been the main driver of change up until modern days. This drive for growth however, as we all know too well, has led to some pretty devastating consequences. We are slowly running out of resources and the weaker individuals of our societies are being left behind. One could argue that this is partly evolutionary in nature, and a 'natural course of action'. However, humans are smart and they are reactive and it's becoming increasingly clear that our focus when it comes to business should shift from sole economy growth, to a more holistic definition of growth that includes respect for our environment as well as our society as a whole.

Food waste, has been and still is one of the biggest wicked problems of our time. Luckily, a new venture is being established as a key player in the South Holland ecosystem to combat food waste at a large scale. The port of Rotterdam estimates 1 billion kg of food being wasted every year due to reasons that have nothing to do with edibility: cosmetic reasons like shape, size and the presence of spots, or over-supply. [1] The Stichting Duurzaam Brouwen (SDB) has gathered partners to propose a new business opportunity to manage this waste: the Circular Hub for Fruits and Herbs. The idea is relatively simple: there are large quantities of high quality food waste that are currently being incinerated or composted and plenty of businesses who could use this waste for high value applications. However, bringing the two together comes with difficulties that require a new venture to coordinate the relationships and waste flows. The knowledge and waste flows being established in the Hub can be seen in Figure 1.

The port of Rotterdam, Greenport West-Holland and the Dutch Fresh Port will supply the fruits and herbs from the rejected batches. These will then be processed by Pameijer, a centre offering work opportunities for individuals who are distanced by the labour market, offering them independence and a positive outcome for the future. At Pameijer, the large quantities of food are portioned and processed to be redistributed to SMEs. The knowledge and procedural managerial activities are provided by the SDB and the Hogeschool Rotterdam,

Figure 1. Schematic of the relationships and responsibilities of each partner of the Circular Hub. [1]

where research can be performed on how to best treat the food and how to implement the business. Lastly, the waste that cannot be turned into high-value applications is processed by GroenCollect whose labour force is also largely composed of marginalised individual.

It is clear overall what a great contribution this Hub has the potential of being, from a sustainability and environmental standpoint, but also from a social responsibility perspective. However, it is important to fully analyse this initiative to identify key focus points to ensure success. The research question being explored in this review is: *what are key activities and elements to consider to set up a successful Hub that contributes to sustainability goals effectively?* This paper aims to do give a general perspective on both the aspects of using food waste as a resource, as well as to analyse key aspects of business model development to ensure a successful and sustainable future for the Hub.

Food waste: a giant obstacle to sustainability

Food waste has received increasingly more and more attention as a sustainability issue [2]. The Food and Agriculture Organisation (FAO) differentiates amongst ‘food losses’ at the early phases of the supply chain and ‘food waste’ which occurs during consumption. The definition

of food waste excludes food losses that are deemed unavoidable or inedible, such as egg shells. [3] As one of the wicked problems of our time, food waste represents not only an environmental challenge, but also a social challenge. The dichotomy between demand and supply of food in third world countries compared to first world countries is shocking. [4] Rich countries see availability of all kinds of products, whether in season or not, with a range of produce that needs to travel for thousands of kilometres to reach our plates. So while scarcity of food in poorer countries continues being a pressing issue, first world countries have become so accustomed to food availability that it is being wasted to alarming levels. [2,3,4] In fact, it was found that household income and food waste are positively linked to each other, the higher the income the more food is wasted. [3] In Europe alone, it is estimated that in the whole supply chain, 89 million tonnes of food a year is being wasted, amounting to roughly 179 kg per capita.[4] Putting this figure in economic terms, it equates to roughly 143 billion euros per year of food waste costs.[5] This is particularly shocking as it is estimated that about 1 billion people worldwide suffer from malnutrition due to lack of stable food supplies.[4] An increase in food waste in richer countries, combined with rising level of population worldwide, increases the demand of food and further puts pressure on the supply system to deliver. This feedback loop of demand and supply will inevitably further increase costs of food, further putting people in lower economic class at risk of malnutrition.[4] In Europe, most of the food waste occurs at a household level, counting for about 53% of the total.[5] In order to decrease food waste at this level, social interventions are the most promising ways to counter the problem with key actions like raising awareness amongst consumers.[6] For the purpose of this study, the focus however will remain on the pre-consumption phases of food waste to identify pitfalls and possible points of improvements that the Circular Hub can have an effect in.

Our current food supply is linear in nature and consists of some distinct phases. These are: production, processing, storage, distribution and disposal. The biggest culprits of food waste in the distribution chain are at the storage and distribution phases [7]. This occurs because agricultural produce, especially fruits and vegetables, are perishable items and their quality decays over time, a process that is quickened if the storage and transport conditions are not optimal.[3,7] Other reasons for generation of food waste at a wholesaler/supply level are due to mishandling, mistakes in labelling and packaging and oversupply due to wrong projections in demand.[3,8]

Overall, it is clear that food waste is not only an environmental issue but clearly even more so a social one, therefore, a perfect problem to be tackled through business models for sustainability such as the Circular Hub

The role of policies in food waste

Governments take an important role when it comes to food waste, especially at the supply chain level. At this level, policies and regulations about both the reduction of food waste as well as its recycling can make an important contribution to the issue.[3] Unfortunately, this is not a straight forward task. In fact, to make a difference, these policies need to be holistic taking into account all stakeholders involved, and the parties need to act in a synergistic way. [3] A demonstration of this is the failed attempt of the Dutch Ministry of Agriculture, Nature and Food Quality, to reduce food waste by 20% throughout the whole chain by 2015. The new target is even more ambitious, a 50% reduction in waste is set to be reached by the year 2025.[3] So it is evident that the will is there, but what actions are governments actually taking to ensure that these targets are met?

One obvious way to go about is to attach economic incentives for companies to avoid sending food to landfill. The first measure is landfill taxes and it applies to all materials being sent to landfill, the less you have to incinerate, the less it will cost to do so. Food donations is another viable way to reduce food waste of good quality products. In order to incentivise these, governments can decide to grant tax deductions and VAT exemptions to companies that choose to take this route. However, a downside of this approach are product liability legislations. Suppliers maintain liability of the products until delivery, even if they are being donated. This can cause some companies to choose to not take this approach to avoid possible problems.[8,9]

However, laws and regulations can also act to increase the amount of food waste in various ways. For example, fruits and vegetables are mainly wasted in the primary sectors and between traders. A large portion of these kinds of products are wasted due to strict marketing policies about their shape, colour and sizes, all cosmetic reasons that by no means hinder the edibility of the products. This has been widely recognised as a problem, and in 2009 the marketing standards outlined by two EU wide regulations, were reduced from 36 to 10. This intervention was expected to reduce waste, however the effect was negligible. The reasons

were that private parties continued to enforce strict standards based on the old ones, and the supply chain could not update their operations to adapt to the possibilities that fewer standards brought.[8]

Another process that leads to a lot of waste is the measurement of contamination in food, referred to as Maximum Residue Levels (MRLs). Generally speaking, some of the regulations regarding food safety are really strict and lead to a lot of food, especially fruits and vegetables, being destroyed. A few of the reasons should be re-evaluated on a European level. For example, it is prohibited to treat products and use decontamination techniques to clean the food that showed high MRLs. Furthermore, the detection techniques for MRLs have become more and more sensitive, leading to certain contaminants being found at very small quantities. However, the tolerance for certain MRLs have stayed at zero, not accounting for the improved measurement equipment.[8] To counter this, in 2021 the European Union loosened the regulations on food hygiene while maintaining quality as a way to facilitate food donations.[9]

Furthermore, similarly to the marketing standards, the food safety standards employed by private parties tend to be stricter than the legal requirements. Many products are imported and undergo several import checks. The Netherlands applies stricter import controls than any other European country, however, there are not many import inspection points in the country and the process can be lengthy. These factors combined lead to perishable products (like fruits and herbs) to spend a large amount of time stored before they reach trading centres, which contributes to direct waste or the products having reached maturity and needing to be consumed quickly.[8]

Finally, product liability regulations can contribute to food waste. Responsibility for products is maintained until delivery, therefore companies choose to apply stricter “best by” dates to avoid incurring into issues. What this means is that at retailers, the shelf life of these products is shorter than it should be and causes unnecessary waste. Due to product liability, there are very strict labelling directives to be followed to ensure food safety. If labelling mistakes are made, the cost of completely repackaging and relabelling products is too high to justify it and therefore products end up being wasted.[8]

Food waste initiatives and their contributions to sustainability

In order to devise solutions for food waste from a business perspective, the different levels of food waste should be properly analysed and understood. The three major sources of food waste occur at the household level, at the food service level and at the food processing/agricultural level.[2] Of these categories, 75% of waste is deemed avoidable.[2] Luckily, in recent years a number of initiatives have emerged to tackle food waste on these different levels. An example is the “No Waste Deal” project (TIPPR), a platform where suppliers and wholesalers offer imperfect food products which cannot be sold, for hospitality SMEs to buy at a competitive price.[10] Supermarkets have also started to take responsibility in this food waste problem. For example, most if not all supermarkets now offer “bonus” prices on products that are close to expiration dates.

One step further was taken by the Ekoplaza stores, which together with their suppliers tried out a pilot project to offer surplus of fruits and vegetables in their stores. This “elastic chain project” was a great test on the flexibility of both supplier and supermarket, and was a clear example for understanding what is important in such relationships. Clear communication between the parties was crucial for a successful implementation of the project. Furthermore, consistency in the supply frequency and in the quality of the produce were highlighted as important conditions for the success of the partnership and the project. What was really interesting from this case, relating it to the circular Hub, is the fact that the supply of the surplus from the wholesaler was standardised for every shop, even though they had different scales of operations. This resulted in some supermarkets having more produce than they could handle in sales.[11] This is good evidence as to why portioning the surpluses into small, manageable amounts for each entrepreneur and SMEs is a key business decision for the circular Hub. The elastic chain project, which has a similar nature as the circular Hub, was successful in reducing food waste by roughly 2/3 of all delivered surpluses [11]. Table 1 shows the amounts of each type of produce which was delivered to Ekoplaza and how much of it was sold to customers.

These results are promising but should be taken with a grain of salt. Firstly, the produce is not supplied with a barcode, therefore these data were collected manually, which could result in errors.[11] Secondly, the food is sold to private consumers, which is one of the largest food waste sources.[2] In fact, in Europe alone the average food waste per capita per year at consumer level is 76 kg. On top of that, there is no real need for a change in consumer

Product	Aantal ingekocht stuks/kg	Verkopen stuks/kg	% gered
5st watermeloen	720 stuks	462 stuks	64%
15kg grapefruit	1650 kg	419 kg	25%
7st zoete bataat	0	0	0%
6st bleekselderij	600 stuks	560 stuks	93%
10st paksoi	540 stuks	506 stuks	94%
8st zoete bataat verpakt 1kg	390 stuks	390 stuks	100%
6st tomaat wild wonder 200g	648 stuks	442 stuks	68%
7st mango kent	1190 stuks	531 stuks	45%
16st komkommer	1600 stuks	1048 stuks	66%
10st grapefruit genet 500g	600 stuks	419 stuks	70%
16st avocado	1600 stuks	922 stuks	58%
	9538	5699	60%

Table 1. Amounts per product being delivered to Ekoplaza stores and sold to customers. Grapefruits had the lowest amount of rescued product with 25% being sold. 100% of leftover sweet potatoes were sold to customers. [11]

behaviour as food waste is something that financially, most people in first world countries can afford.[4] Tackling food waste on a higher level with the circular Hub via the Port of Rotterdam and SMEs could therefore be arguably more valuable than relying on consumer behaviour alone. Avoiding waste would be directly responsible for a reduction in consumer prices of food [7], and even though private consumers are not necessarily interested in lower prices, small and medium scale businesses are. Therefore we can assume it is in their best interest to extract as much value from their food purchases as possible, thereby actually contributing to the reduction of food waste. Furthermore, the estimated food waste from food services is generally considerably smaller than the per capita household waste [4], so choosing SMEs as recipients of the food surpluses, as opposed to private consumers, is the safest choice in terms of actually reducing food waste.

Processing food waste at the Circular Hub

The port of Rotterdam is the source of an estimated 89 billion kgs that end up in the Dutch ecosystem[1] . However, as already discussed, a large portion of this is wasted despite still being perfectly edible. The Circular Hub initiative aims to put a stop to this, but it is not as simple as take it and redistribute it, although it could be.

The aim of the Circular Hub is to prevent as much food as possible from becoming wasted at the port of Rotterdam by acting as a logistical centre to manage and redirect fruits

and herbs to different SMEs in the area who can use it for their own businesses. As a rule of thumb, the less work, resources and energy goes into a process, the more sustainable this will be. [12] There are therefore three possible ways to treat the surpluses, given in the order from the least complicated process to most: portioning, conditioning and lastly fractioning.

Portioning refers to the act of dividing large quantities of a single food item into smaller portions. This is an easy process that can be done manually, therefore it is not energy intensive and at the same time provides easy employment as it does not require a lot of labour skills. This first step is important as the quantities of food that are considered waste at large collection points are too large for one single SME to collect and use. On the other hand, selling only a portion of their waste food stock would require too much logistical effort for institutions like the port of Rotterdam, therefore these amounts go to waste. A real life example was the case of the brewery Vet and Lazy [13] wanting to collect a small amount of “waste” pomelos but not being able to do so as it was “all or nothing”, they could not handle the entire amount of pomelos and therefore they could not collect it and use it for their products. By collecting the entirety of the surplus, dividing them into smaller portions and selling these to SMEs the Hub can act as a logistical centre to easily redirect surpluses amongst a variety of SMEs, while collecting the entire amount from the port of Rotterdam. The assumption to test is that restaurants and other SMEs from the region would be willing to purchase these surpluses at a regular price as this will contribute to their sustainability profile, although this should be verified with a thorough market research. Furthermore, there are a number of circular entrepreneurs in the region who, as was the case for Vet and Lazy, already work with waste business models and would definitely work with the Circular Hub as shown in the declaration of the intents in the project proposal. [1]

The second possible treatment is conditioning of fruits and herbs to increase their shelf life. These are all kinds of treatments to make the fruits and herbs last longer: cooling and freezing, pre-cooking, packaging, pasteurising, etc. They are all simple treatments requiring simple technological methods that should be easily achievable by the employees from Pameijer. Depending on the kind of waste stream received, different methods can be used to condition it and increase the shelf life. Therefore it is a requirement for the employees to be flexible and to know what process to use for which waste stream and application. The manual labour nature of the Pameijer employees is perfect for this, as they do not rely on strict industrialised processes but can instead tailor their work to what is needed on a specific day. However, it is important that the management of the Hub has the right knowledge to

direct the work depending on the waste stream and is able to communicate it effectively to the employees at Pameijer.

The last treatment option for food waste is fractionation. The term fractionation refers to a variety of different processes specific to different waste streams, but it could be generally described as the process of breaking down fruits and herbs to extract useful components [14,15]. For example, essential oils can be extracted from herbs via a fractionation process [16]. The essential oils can be used by soap making companies like Kusala [17], a company which uses 46% circular materials for their soaps. Another interesting application of essential oils from fruits and herbs recently being studied is the use of these oils for food preservation due to their antimicrobial and antifungal properties [16]. These oils could then be used to preserve the other food streams at the Hub directly. However, as mentioned earlier, fractionation processes can be energy consuming. Interestingly, some new dry fractionation techniques are being studied [16] which would lower the environmental strain of these processes. Once more, the management team of the Hub should be knowledgeable on these topics and remain up to date with latest developments to be able to direct the appropriate processing technique for a given waste stream.

Business models for Sustainability - how to establish the Circular Hub with lessons from theory

For a business like the Circular Hub to be truly sustainable, it is important to consider the way it is run from a business model perspective. Business models for sustainability (BMfS) have started to emerge as a way to continue developing, but doing so in a more conscious way towards society and the environment, by including sustainability in the core values of the company and/or business.[18, 19] By implementing BMfS, companies are able to continue creating value through economic growth, but this growth is utilised as means to contribute to value creation in the environment and society.[18] Amongst the major principles defining BMfS are an efficient use of resources, an ethical approach to sourcing (of materials, labour, etc) and consideration for social relevance and involvement.[20]

Certain drivers exist that make BMfS a viable options for businesses, and in doing so increasing their chance of success. It is not surprising that one of the biggest drivers for sustainability stems from the people who make the company. More specifically, a personal interest in sustainable values aligned with organisational values is the first necessary driver for

a greater chance of success in implementing a sustainable business model. [19, 20] However, this is not enough. The individual drive needs to be accompanied by clear business incentive to make the business model shift economically profitable in short and long term. [20] In the case of the Circular Hub, this is a very important aspect to keep in mind when finding the right management for the company. As it is right now, the founding team does not intend on leading the company, but only help setting it up. The future management should possess qualities like being proactive [18], risk tolerant, having a long term vision and being able to pursue a bigger vision by implementing a larger amount of smaller scale initiatives.[20] Overall, aligning company culture with sustainability operations is crucial to implement BMfS successfully.[20] However, while this should be expected from the management of the company, this is not something that should be a requirement for the workers themselves. As discussed earlier, Pameijer employs marginalised individuals and the jobs provided by the Hub will be simple and tailored to their capabilities.

As mentioned, another driver that make BMfS successful is economy viability. A business that cannot sustain itself financially in the long run, is not a sustainable business. The difference with conventional business models is that the profitability is not the only driver, and it is achieved in a sustainable way, economically, socially and environmentally.[19] In fact, companies implementing BMfS have two major objectives which can be summarised by: achieve economic viability and be “sustainable”. However, when in conflict the latter always take precedence as part of core business values.[19] By achieving financial returns, a company can then continue investing in more sustainable practices that create a profit in more ways than one, not only monetary.[19, 20] Money, in short, is a means to an end, the end being operating with sustainability at heart of operations. [19] The Hub does not aim to become a for profit organisation, however, keeping a state of financial independence should be one of the core activities of the Hub to ensure that the key sustainability goals can be achieved long term. Particularly, when seeking investments it is vital to only accept funding through sources that support the core sustainability objectives of the Hub [19]. It is expected for example, that part of the costs of the labour will be covered by the work of the Hub but also partly by social security. This allows a certain economic independence that will allow the Hub to keep running and maintaining operations.

A fundamental aspect that often comes up when discussing sustainability is cooperation. Creating a strong, diverse network to support a company’s operations can really help in making the company successful. [19] In a successful collaborative environment, all

parties are going to benefit from the business operations and create a higher chance of success for the BMfS. Cooperation does not stop at collaboration amongst external parties, it is just as important to establish a cooperative environment within a company. [20] In the Hub, this point is already at the core of the business model. The cooperation between the port of Rotterdam, Pamaijer and the small/medium enterprises is going to be necessary for business operations. In particular, there should be strong efforts to create the fundamentals to maintain these partnerships in the longer term [19]. Related to this point, is the ability of a firm to take advantage of its network and be attuned to outside information to drive changes within a business model to increase the potential for capturing value [18]. The negative side of this, is that often in sustainability, external institutions, investors, etc, are not yet ready for the innovation that entrepreneurs bring forth. This resistance can lead to big delays between initial conception of the business idea, and having an actual BMfS implemented [18]. This is something to be aware of when trying to create a new venture. The advantage of the Hub is that a strong network is already in place, and this initial cooperative is enough to start the operations swiftly.

As already mentioned, internal organisation structures can foster or hinder the implementation of BMfS. While visionary leadership is key in the implementation of BMfS, leadership needs to also support the involvement of employees and their personal development within the company to increase chance of success. This is closely linked to how environmental and social causes are personally viewed by the actors involved in the company [18]. As mentioned before, alignment of core values throughout the entirety of a company is fundamental for successful sustainable plans implementations. This, can be achieved by implementing an open and transparent culture amongst team members. Other organisational aspects that can lead to a successful establishment of BMfS are flat structural hierarchies and good relationships amongst employees.[20] These aspects are all very important to keep in mind when building the core management team of the Circular Hub.

Adaptability is a key word when it comes to sustainable business models. BMfS which retain the ability of being dynamic and changing in response to pressures and opportunities, have a higher chance at becoming successful.[20] The Hub is dynamic in nature, and therefore can guarantee very quick response rates to changing conditions (for example, availability of certain kinds of fruits and/or herbs changing relatively unpredictably). Maintaining this quality would be beneficial for the success of eventually scaling up the Hub. Analysing the adaptability of the customers of the Hub (small to medium food and beverages companies)

should also be part of the core activities in the implementation phase. Are these companies ready to be adaptable in the way they receive their goods?

Closely related to this point, when looking at BMfS from a systems perspective, is the ability to recognise feedback loops between the value proposition, the value creation and the value capturing opportunities in a timely manner.[18] It is important to be attuned to the environment and system the company operates in, and recognise, anticipate and react on opportunities.[18] Therefore, a proactive leadership, as already mentioned, is crucial.

Another important driver to consider are legislations and regulations. These can act as a driver when for example, certain certifications or legal incentives exist to businesses who act sustainably [20]. On the other hand, especially in the circular economy, rules and regulations can actually act as a hindrance rather than catalyst for sustainable innovations.

Customer preferences and competition have been found to be both a driver for change towards BMfS, however sometimes that is not the case [20]. In fact, competition can actually threaten the economic performance of companies implementing BMfS's.[19, 21] Arguably, this difference in reaction to competition and customer demand could be explained by the maturity level of the company. A larger corporation, with disperse leadership will be slower at implementing change and therefore, might find external stimulations like competition and demand to be drivers that need a faster reaction than a change in individual and corporate values [20]. On the other hand, a smaller company and/or new entrepreneurial ventures will more likely be quicker to implement sustainable changes based on the knowledge and values of the management team(s) and/or founder(s) [18] and might face more issues doing so as response to competition from larger, more established firms.

The business model of the Circular Hub falls under the definition of strong sustainability according to [18]. Strong sustainability is defined as including the core business into socio-ecological systems. [18] In fact, the implementation of sustainability in business models should go hand in hand with the inclusion of sustainability into overall corporate strategy [20]. This is specifically important to define the corporate strategy of the business. When operating within a sustainable framework, businesses encounter more objectives, stakeholders and institutional logics (turning a profit but also doing good to the environment and society) than companies which are run with a “business-as-usual” mentality. By having a clear, sustainable corporate strategy the clashes that may arise amongst conflicting instances (e.g. being sustainable costing the company more, thus reducing profit) can be avoided. [19] The

Hub introduces a new business model that is quite innovative and positions itself into an existing inefficient system, implementing innovations both on an organisational (the reduction of food waste by providing access opportunities) and societal (employing individuals who have had a difficult time accessing the labour market) dimensions. [18]

Being consistent and transparent will help the Hub maintain credibility and build a vision that resonates with the ambassadors and community of the Hub.[19]

Discussion

Food waste is an important issue to address, however, the problem is so vast that its quantification can be very difficult. In fact, the actual amounts of food waste are uncertain, with models and quantifications of waste giving vastly different amounts depending on base assumptions [4, 5]. For this reason, making estimates on the scale of the problem and where the biggest problem lies is a complicated and nearly impossible task. While according to literature most food waste occurs at a consumer level, there is a significant portion generated at large collection centres like the port of Rotterdam. Having had conversations about this with the port authorities, we can speculate that due to the legislative way food waste is considered and quantified, a very large number of waste is not being currently taken into account. While the core activity of the Hub is not to collect data, having such a centre operating in South Holland can help to shine a light on the true scale of food waste coming from collection and storage centres at various ports in the Netherlands.

Currently some food streams are used to generate biogas, leading to CO₂ neutral energy. Arguably, this could be considered a good solution for food waste, especially in current times. However, not all food waste can be processed this way. In fact, due to the molecular properties of citric fruits, they are not suitable for this way of processing as they have natural inhibitors that stop the production of biogas in the bioreactors.[22] There are more fruits and herbs that cannot be turned into biogas, therefore a solution for these waste streams is still necessary in order to avoid incineration. The Circular Hub can respond to this gap in the waste processing chain by providing an alternative for these kinds of waste streams.

Tackling the issue of food waste is for sure a great step in the right direction to make a sustainable transition. However, to make food truly sustainable, it is useful to look at the issue in terms of food systems. [23] A healthy food system requires more aspects to be considered

truly sustainable. Our health and the health of the environment are connected: a sustainable food supply for us means an environmentally friendly system for the planet, which is economically accessible for the population and provides the correct balance of nutrition needed for a healthy lifestyle. [23] Looking at the environmental footprint of certain foods, it is noticeable that a primarily plant-based diet can supply the right nutrients while significantly decreasing the footprint of one's diet. For this reason, focusing on fruits and herbs with high nutritional value and low environmental footprint is a great strategy and starting point for the Circular Hub to truly maximise its impact. For example, the green house gases emissions of fruits and vegetables are over 75 times lower than the emissions for beef. [23] By promoting the consumption of fruits and herbs, the Circular Hub can also tackle sustainability not only from a waste perspective, but also from a consumption point of view and contribute to a more holistic approach to make food systems sustainable.

Looking at the business model, a few key components were identified for a successful implementation of the Hub. Firstly, the management team needs to be aligned in their sustainability values. As already mentioned, this cannot be expected from the employees at Pameijer themselves. However, small initiatives to increase the awareness of the employees can still be implemented to try to align everyone's values towards sustainability. Secondly, whilst the Hub aims to remain not-for-profit, economic viability should not be left as last priority. A good market analyses of possible SMEs as customer base should be conducted during the pilot project for the Hub to ensure longevity. Thirdly, cultivating a cooperative environment amongst all the parties involved is crucial to create a sustainable business in the long run. Lastly, due to the nature of the business and the environment in which it operates, maintaining high adaptability is crucial for the business to succeed. This is a quality that should be shared amongst the partners of the Hub itself as well as its customer base.

Finally, measuring sustainability is the only way in which we can ensure that as a society we are being more sustainable. However, measuring sustainability objectively is a really difficult task that requires a lot of training, specialised software and specific skills. Eventually, it would be advisable to hire an external agency to perform a comprehensive sustainability assessment of the Hub. However, internally there should be from the start some simplified systems in place to at least be able to account for food waste that comes in as well as the food that is being sold to customers, and the portion that is being delivered to be further processed by GroenCollect. As already mentioned, to ensure the most efficient use of energy and resources, portioning and conditioning activities should remain preferable over

fractionation activities. Due to the adaptable nature of the business, different waste streams could have different treatments, depending on the situation. It would be advisable to ensure that in the management team of the Hub someone will be appointed to make rough estimates and advice in terms of sustainability when more than one processing option is available. For example, the Best Worst Method is an approach that can be implemented to make sustainability decisions without having to invest too much time making an assessment. This method allows for multi criteria decision making to pick amongst alternatives to the same problem by weighing each criteria and making a decision that way. It does not require extensive mathematical modelling, but it allows for making fast but comprehensive choices, which is a good compromise for the fast-paced decision making environment the Hub will operate in. [24]

Lastly, taking a step back and considering the overall sustainability contributions, some argue that reducing environmental impacts is enough to provide value to the environment [18, 25]. In this sense, the Hub also operates this way. Environmentally speaking, the impact created by the Hub is in the reduction of food waste. However, taking a more holistic approach one could argue whether the reduction on negative impact can really be considered as value created for the environment. Creating value for nature and our ecosystem can in fact have direct contributions to our overall wealth, which can also be quantified in monetary gains. [26] In the social dimension, by employing less fortunate individuals and providing them with economic independency, there is clear value gained to our ecosystem as humans. By always trying to do better than “less bad”, new ventures have a real chance at bringing forth disrupting innovation and truly find innovative ways to heal our planet and ourselves.

Conclusion

Overall, the Circular Hub for Fruits and Herbs has great potential to reduce food waste of large collection centres like the port of Rotterdam. Food waste is a big problem that requires multi-faceted solutions at different levels. But while there is a lot of interest and attention in the consumer side, the large waste flows from big centres are currently not being paid a lot of attention to. The establishment of this Hub could not only lead to the reduction of large amounts of waste, but it will do so by creating more value by transforming low waste into high value products. The sustainability incentives of the Hub not only lie on the reduction of

waste, but also in the employment of marginalised individuals which will contribute to a more sustainable society. Taking into account business models for sustainability theory as well as some learning outcomes from previous initiatives, the Hub can be established with the highest chance of success, in terms of viability and sustainability.

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