

Chapter 4

Promising Sustainable Foods: Entrepreneurial Visions of Sustainable Food Future

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Abstract

This chapter examines visions for sustainable food futures with a specific focus in entrepreneurial solutions proposed by agricultural and food start-ups.

Proponents of this current technology-focused wave of food entrepreneurship claim that their ‘solutions in the making’ contribute to a sustainable food future; these resemble claims made by alternative food networks. The chapter explores three Swiss food start-ups that each develop novel means of food production and consumption, including indoor agriculture and insect-based foods. Based on an analysis of the start-ups’ websites, supplemented by interviews and short field visits, the chapter considers how the start-ups propose to contribute to a sustainable food future and the extent to which they draw on and ‘mainstream’ alternative food networks’ ambitions and goals. The analysis reveals that rather than signalling the adoption of alternative food networks’ goals, food start-ups are contributing to the entrepreneurial redefinition of what constitutes ‘sustainable food’ and how this can be achieved. These processes of ongoing redefinition and their implications have the potential to shape collective ideas of how (best) to achieve food security.

Envisioned food futures

In a recent article published in the British newspaper *The Guardian*, former US President Barack Obama (2017) described his vision of a sustainable food future. He declared that

[t]he path to a sustainable food future will require unleashing the creative power of our best scientists, and engineers and entrepreneurs, backed by public and private investment, to deploy new innovations in climate-smart agriculture. Better seeds, better storage, crops that grow with less water, crops that grow in harsher climates, mobile technologies that put more agricultural data – including satellite imagery and weather forecasting and market prices – into the hands of farmers, so that they know when to plant and where to plant, what to plant and how it will sell. (Obama, 2017)

This vision conjures up a scenario of agricultural production that focuses on science, engineering and entrepreneurship as the main vehicles to achieve a sustainable food future. Obama illustrates his vision through examples such as crop science and precision agriculture, which commonly represent human scientific progress and technological development, and require considerable amounts of public and private investment. Also noteworthy is what Obama does not mention in his vision of a sustainable food future: there is little reference to existing or anticipated efforts of state governments (except for public funding of research), international organisations, corporations, nongovernmental organisations, cooperatives, social movements or activists.¹

Obama first presented a version of this article as a keynote speech at ‘Seeds&Chips, The Global Food Innovation Summit’ in Milan, Italy, on 9 May 2017. The event brought together a large number of so-called foodtech and agtech start-ups,² established food-

¹ He briefly refers to activists in a later part of his article, when he states that activists often forget that “once you’ve got the attention of the people in power, then you have to engage them” and proposes several ways of how best to achieve this by presenting facts, being willing to compromise, and “propos[ing] concrete solutions.”

² “Agtech” and “foodtech” are two abbreviations commonly used in entrepreneurial and venture capital settings for agricultural and food technology start-ups respectively. The term is also used in (social) media reportage. A start-up is a business or company that has recently been founded centred around an innovative product, service or business model. To support the development of the company, start-ups seek public and/or private investments in the form of crowd funding, angel investment, venture philanthropy or venture capital.

related companies, investors, and representatives of accelerators and incubators, as well as representatives of alternative food movements (e.g. Slow Food), and food-related NGOs and associations. As the organisers state on their website:

Seeds&Chips believes that technology is increasingly playing a key role in the food system and has the potential to solve the most important and vital challenges we face: ensuring healthy, safe and sufficient food for all.³

Comparing Obama's vision of a sustainable food future and the statement by Seeds&Chips reveals strong parallels: in both cases, technology is framed as a solution to broader environmental and societal problems.

Scholars in the multidisciplinary field of science and technology studies (STS) refer to such visions of innovation as *technologically deterministic*.⁴ They argue that claims that present the development and use of technologies as a major cause of change in society are problematic because they present a reductionist perspective that construes technology as separate or external to society with the capacity to influence from the 'outside'. An STS perspective, in contrast, advances the (perhaps provocative) view that technology is social: all technologies are designed, produced and used by people.

I argue that an STS-informed perspective enables a closer analysis of the envisioned relationships between technology and society, like the ones articulated by Barack Obama and Seeds&Chips. To do so, I draw on a specific strand of the STS literature attending to the enactment of sociotechnical expectations and the making of futures in relation to new technologies. This conceptual repertoire informs my analysis of three food start-ups, which enables me to consider some of the described visions in detail. The material I present in this chapter forms part of an ongoing research project on emerging

³ <https://www.seedsandchips.com/4-8-17news-growth-train> (accessed 14 August 2017).

⁴ Beyond STS, these claims have been criticised by a number of other scholars from a variety of disciplines, including, but not limited to, media and communication studies, sociology, philosophy and literary studies.

agtech and foodtech and the future of food.⁵ In this research I adopt an ethnographically inclined perspective on entrepreneurs' online and offline practices that can be described as embedded, embodied and everyday (Hine, 2015). I seek co-presence with various actors of the agtech and foodtech ecosystem on- and offline by attending industry events, following and engaging via websites and other digital platforms, reading industry e-newsletters, and conducting formal interviews, informal conversations and ethnographic field visits. In this chapter, I focus on three Swiss agtech and foodtech start-ups, analysing and comparing their promises and visions with those articulated by alternative food networks (AFNs). The start-ups are typical of wider trends in the start-up and investor arena, which over the last five to ten years has seen significant growth of agtech and foodtech start-ups in general and those addressing sustainable food production and consumption in particular.

In what follows, I consider how Swiss agricultural and food entrepreneurs configure and present their 'solutions in the making' as global solutions that can easily travel beyond national boundaries. Connected to this, I discuss how the technical solutions advanced by food start-ups are frequently presented as superior to other potential solutions for sustainable food futures as they are depicted as offering large-scale effects and positive environmental impacts. However, my analysis reveals that start-ups also draw on sustainability narratives deployed by AFNs. In other words, start-ups combine the promise of efficiency of the agricultural production-oriented approach with the sustainability concerns of the alternative food systems approach – two distinct perspectives often advanced in academic, industry and policy debates on food security. This leads me to problematize the extent to which we are witnessing the adoption and mainstreaming of alternative food networks' narratives. I propose that what we are instead witnessing is an entrepreneurial redefinition of sustainability, and with this a redefinition of what 'counts' as a good solution for food security, who would be able to

⁵This exploratory research project, entitled 'Venture Food: A Sociological Study of Venture Capital, #foodtech and the Future of Food', is supported by the Basic Research Fund at the University of St. Gallen, Switzerland.

achieve it and how. I conclude with a discussion of what this means for alternative food networks, food producers and consumers.

Unsustainable food present

The future of food is debated in a wide range of sectors and settings, including academia, agriculture, industry, public policy, government, international organisations, media, social movements, consumer protection agencies, peasant organisations and non-governmental organisations. With continuing population and consumption growth, intensifying competition for land, water and energy, and the likely impact of climate change, these debates frequently centre on the key challenge of how to feed nine to ten billion people by 2050 (Godfray et al., 2010; Wheeler and von Braun, 2013). Most food strategy experts agree that without fundamental changes in how we produce and consume food, global food security and global health will come under threat (de Schutter, 2011; Foresight. The Future of Food and Farming, 2011; McKeon, 2015; Stuckler and Nestle, 2012). There is, however, considerable debate about what changes are needed, what constitutes food security, and how it can be achieved.

Food policy experts Tim Lang and David Barling (2012) provide a socio-historical analysis of the shifting meaning of food security and review current debates about how to achieve sustainable food systems. They identify two main perspectives: the agricultural production-oriented approach that stipulates that food security can be achieved by producing more food; and the food systems approach that emphasises the need to address a complex array of issues 'beyond' production, including social and environmental considerations. In Lang and Barling's (2012: 314) view, the agricultural production-oriented approach and the food system approach will compete for dominance. However, both approaches are bounded by the "basic truth ... that the only food system to be secure is that which is sustainable, and the route to food security is by addressing sustainability" (2012: 322). They observe that debates on food security are still dominated by a productionist focus but emphasise that "even mainstream 'official' analyses now attempt to address sustainability", which could be read as a

“modernising” or “softening of the image of productionism” (Lang and Barling, 2012: 320). Following Lang and Barling’s observation, I propose that agtech and foodtech start-ups (which tend to have a production-oriented approach) increasingly define their visions and products in relation to sustainability. However, I suggest that it is important to ask what exactly these start-ups mean when they refer to sustainability.

Proponents of the production-oriented approach frequently present increasing production as a solution to the problem of feeding a growing population globally by 2050. Isobel Tomlinson (2013) problematises this imperative and argues that such “statistics are a key discursive device being used by institutions and individuals with prior ideological commitment to a particular framing of the food security issue” (Tomlinson, 2013: 82). This narrow framing of food security is problematic because it exclusively focuses on increasing food production, which is likely to exacerbate existing environmental challenges; it also excludes important issues from the definition of food security (Tomlinson, 2013: 84). Going beyond food production, the food systems approach encompasses the whole food chain, from farm to fork. This approach highlights the interrelatedness of food production, distribution and consumption and considers resulting environmental or public health effects. A range of social movements, such as La Via Campesina, are proponents of a food systems approach (see Chapter 6 in this collection). Their and other movements’ efforts have resulted in an “alternative set of discourses around concepts of ecological food provision, food sovereignty, and agroecology” (Tomlinson, 2013: 88).

Alternative food movements, including the Slow Food, organic and fair trade movements, aim to create new economic and cultural spaces for trading, producing and consuming food (Counihan and Siniscalchi, 2014; Goodman, DuPuis and Goodman, 2014). However, in the last decade, organic, fair trade, slow and local foods have increasingly become available and sold beyond alternative economies or specialised fair trade and organic food shops (e.g., Sassatelli and Davolio, 2010). As several chapters in this collection have already alluded to, researchers of alternative food networks and

food activism tend to problematize this development. Goodman, DuPuis and Goodman (2014), for instance, note that

commoditized ethical and esthetic values or 'qualities' are open to mainstream capture that threatens to neutralize the social projects and critical ambition of the alternative food and fair trade movements. ... [T]he interface between 'alternative' and 'conventional' is becoming highly permeable and confusing as actors compete to control these new income streams.

Alkon and Guthman (2017) locate the problem in food activists' tendency to employ market-based strategies that cater to consumers who can afford to make a difference by 'shopping for change'. They argue that this "focus on a politics of consumption...has limited even the most sustainability-minded among [foodies and food activists] to relatively apolitical strategies such as patronizing and creating alternative food businesses" (Alkon and Guthman, 2017: 1).

I argue that beyond alternative food movements, this market-focused orientation facilitates the development of products that can be marketed as potential solutions to current food system challenges (such as climate change or limited resources). Returning to Lang and Barling's (2012) observation that sustainability is a central characteristic of any envisioned food future, it is not surprising, then, to see the emergence of a new set of scientific and technological food innovations that might be classified as production-oriented but claim to contribute to the sustainability of the food system at large. Examples include: new farm management technologies, including drones, sensors and software; novel farming systems, such as vertical farming deploying robotics and new irrigation systems; and innovative foods, such as sustainable protein alternatives based on plant proteins or laboratory meat.

These novel food and agricultural innovations are developed by a vanguard of entrepreneurs who never tire of pointing out how their tools, ingredients or products require less natural resources (such as water or soil) and are, as a result, more sustainable than conventional food production methods. They present this 'efficiency' -

as I will soon explore in more detail – as an important contribution to sustainable food systems were their methods, services or products to be adopted. First, however, I briefly introduce the conceptual framework that informs my study of entrepreneurial visions of sustainable food.

Sociotechnical expectations and futures

STS scholars have developed methods to analyse technology “to move the debate from questions like ‘does technology drive history?’ to arguments about a mutual relationship between technological and social change” (Kline, 2001: 15495). STS scholars’ criticism of different variations of technological determinism, however, does not imply a general dismissal of the effects that technologies have had historically, or are having now on our everyday lives (Wajcman, 2015: 28). Instead, the goal is to consider technology “as a sociotechnical product, patterned by the conditions of its creation and use” (Wajcman, 2015: 29).

I attend to the conditions of technologies’ creation by drawing on one strand of STS: the enactment of sociotechnical expectations and their performative effects. I suggest that a focus on the creation of particular expectations from food and agricultural technologies by a range of different organisations (agtech and foodtech startups and beyond) shows how particular food futures are mobilised. The enactment of specific food futures, in turn, is pivotal to the creation of a relatively new form of agtech and foodtech entrepreneurship that seeks to ‘disrupt’ the current food system with the proclaimed aim of making food more sustainable.

Expectations, as Borup, Brown, Konrad and van Lente (2006) observe, quite literally mean a state of looking forward, and “technological expectations can more specifically be described as real-time representations of future technological situations and capabilities” (Kline, 2001: 15495). Technological promises and visions are often seen as interchangeable (Borup et al., 2006: 286). However, Borup et al. (2006: 286) point out that the latter emphasises “their enacting and subjectively normative character”. This

performative understanding of expectations as “wishful enactments of a desired future” (Borup et al., 2006: 286) is a central tenet of the STS literature on sociotechnical expectations. STS researchers and others show in studies of biotechnology (e.g., Brown, 2003), neuroscience and neurotechnology (Martin, 2015; Schneider and Woolgar, 2015), and genetics (Caulfield and Condit, 2012) how expectations perform certain futures by foregrounding three dimensions of the sociotechnical: they are *generative* as they “guide activities, provide structure and legitimation, attract interest and foster investment”; they can *mobilise resources*; and they *bridge or mediate* across different boundaries and otherwise distinct dimensions (Borup et al., 2006: 285-286).

In recent years, researchers interested in sociotechnical expectations have increasingly paid attention to the role expectations play in market-making (Martin, 2015), or what Pollock and Williams (2010) call the “business of expectations”. They discuss the role of promissory organisations, often intermediaries such as market research companies and consultancies, in mobilising hopes for new technologies. Additionally, they show how these organisations classify and assess expectations, thereby contributing to the making, but also the on-going (e)valuation, of particular industries (cf. Pollock and William, 2016). For instance, Martin’s (2015: 440) research on the neurotechnology industry shows “how expectations play multiple performative roles in helping construct new industries, commodities and markets through the work of promissory enterprises that create forms of value that rest on expectations of the future”. Expectations in this and related research are seen as central in co-producing sociotechnical market assemblages.

Expectations, by definition, are future-oriented and so is talk about innovation that emphasises not only the novelty of the innovation but also its future capacities. To study innovation, researchers attend to “future-oriented abstractions” such as “imaginings, expectations and visions” (Borup et al., 2006: 285) voiced in interviews but also expressed in company reports, press releases, industry conference presentations, and coverage in the media and trade press and on social media platforms.

In relation to food innovation, Stephens and Ruivenkamp (2016) and Lupton (2017) have considered the prominent role that sociotechnical promises and imaginaries can play. Stephens and Ruivenkamp (2016) focus their analysis on media images of in vitro meat (IVM), or what is sometimes referred to as cultured meat. They suggest that

IVM images do different promissory work from the textual narratives that often accompany them. These textual forms...assert the environmental, health, and innovation benefits of IVM technology. In contrast, the promise most easily afforded in the images is that IVM can be produced with the suggestion that it will resemble familiar forms of meat known today. (Stephens and Ruivenkamp, 2016: 347)

Lupton (2017) examines how the online news media introduces and reports 3D printed food technologies to publics. She identifies five major promissory themes associated with 3D printed foods in the global reportage: futuristic, creative, healthy, efficient, and sustainable (Lupton, 2017: 6-13). Drawing on Stephens and Ruivenkamp's study, she argues that "promissory themes play an integral part in contributing to broader sociotechnical imaginaries, working to specifically outline and define the potentials of new technologies" (Lupton, 2017: 3). These "sociotechnical imaginaries" are "publicly performed visions of desirable futures" (Jasanoff, 2015: 4 as cited in Lupton, 2017: 2) that are central in shaping collective ideas of 'ideal' food futures. Thus, what both Stephens and Ruivenkamp and Lupton show is the constitutive effects of visual and textual promises, and how these contribute to sociotechnical imaginaries of desirable and technology-enabled food futures.

Entrepreneurial visions of sustainable food futures

The three Swiss agtech and foodtech start-ups I analyse in this chapter - UrbanFarmers, CombaGroup and Essento - each offer novel ways of producing or consuming foods. Similar to prominent Silicon Valley agtech and foodtech start-ups, they seek to 'disrupt' conventional food production, distribution and consumption (O'Riordan et al., 2016; Sexton, 2016). UrbanFarmers and CombaGroup both develop new systems to grow vegetables (and, in the case of UrbanFarmers, fish), while Essento's focus is on

developing insect-based foods for human consumption. My selection of these three start-ups is based on three rationales: the chosen start-ups develop new processes of food production and/or products for consumption; the start-ups have engaged investors to develop their business idea; and they have developed a prototype or system/product/platform that is already available or very close to being available on the market. This rationale is informed by my larger research project's aim to study the role of venture capital in performing new food futures (see footnote 5). Additionally, I have chosen to study the three start-ups as they present themselves and their food production systems and food products as contributing to more sustainable food futures. The research questions guiding my analysis are: How are agtech or foodtech innovation and its products described and visually illustrated on the start-ups' websites and beyond? Which qualities of the foods are emphasised? Which expectations and sociotechnical imaginaries are present? This enabled me to explore how sociotechnical expectations and imaginaries contribute to enacting new food products and markets, and the role start-ups as so-called 'promissory enterprises' play in creating forms of value that rest on expectations of the future.

UrbanFarmers

UrbanFarmers⁶ (UF) is an urban agriculture company founded in 2011 in Zurich that builds rooftop farms for commercial growers in the city. These rooftop farms are based on aquaponics (AP) technology, which enables growing fish and vegetables in 'close-looped systems'. As UrbanFarmers describes the technology on its website: "In AP, the recirculating aquaculture (fish farming) system discharges wastewater (effluent) that is used as organic fertilizer for plants (hydroponics)".⁷ In other words, the greenhouse contains, and is built around, two sub-systems (hydroponics and aquaculture) that are interconnected and support the growth of vegetables and fish. This technology was

⁶This section is primarily based on information available on UrbanFarmers website, <https://urbanfarmers.com>, but also builds on a field visit to the companies first site in Basel in 2013 that included a guided tour of the rooftop farm and informal conversations with one of UrbanFarmers' founders.

⁷ Available at <https://urbanfarmers.com/technology/aquaponics/> (accessed 2 September 2017).

developed at a Swiss university of applied sciences (ZHAW Wädenswil) and commercialised by UrbanFarmers.

During my visit to the 'grand opening' of the start-ups' pilot farm in Basel in May 2013, I participated in a guided tour of the rooftop farm located in the Dreispitz area, an industrial part of town, to see the close-loop system in practice. A 250m² rooftop greenhouse built on top of an existing industrial building occupies the majority of space.⁸ In the greenhouse, lettuces and tomatoes grow without soil. The plants' roots are suspended in a water-nutrient solution. A smaller room (without windows but with one door) in the corner of the greenhouse contains a tank in which fish, in this case Tilapia, are grown. The tour guide explained the intricate connections between the different subsystems of greenhouse, hydroponics and aquaculture. These explanations often included direct references to the technical equipment required to set up and maintain the farm, including explanations of the computerised control boards and displays.

I was astonished by the highly technically mediated and automated character that much of the infrastructure affords. Whereas I had envisioned food, that is, plants and fish, to be the main focus of the entrepreneurs' attention and the main interactions in the greenhouse to be between plants/fish and staff tending to them, the tour left me with the impression that the key point of interaction is between human and machines. It struck me that only after consulting the various measurements and settings on the control boards would there be an interaction between plants/fish and growers – all the while there was a measured and controlled interaction taking place between fish and plants which sustained each other interdependently.

Of course, any greenhouse is just that: a technical, measured and fully controlled environment in which plants are grown, irrigated and stored until ready for harvest or sale. This field visit was, in fact, more revealing about my ideas of urban farming than

⁸ For a photo of the site, see <https://urbanfarmers.com/projects/basel/> (accessed 2 September 2017).

about UrbanFarmers. I had previously encountered urban farming and gardening as a collective, civic, social movement springing up in various cities in the Global North aiming to re-localise food production by bringing farming back into the city. In the back of my mind were media images and reports of communities of concerned citizens and eaters self-organising and using vacant urban spaces to grow food with the goal of relocalising food production and reconnecting with nature (see also Lyson, 2014; McClintock, 2010; Müller, 2011). How did I conflate civic efforts of urban farming with UrbanFarmers' activities as a start-up? Apart from my general research interest in alternative food networks and food activism (Schneider et al., 2018), which may have led to my preconceptions, I suggest this confusion is in part related to UrbanFarmers' self-presentation in its marketing, communication and public relations efforts.

The home page of UrbanFarmers' website welcomes visitors by inviting them to make a choice between either English or German. After choosing, the visitor encounters an approximately three minute video featuring a montage of images, including: landmarks of the city of Basel; shipping containers; vegetables displayed in a farmers' market; the UrbanFarmers greenhouse; various members, helpers and visitors of the start-up; lettuce, tomato plants and tomatoes; fish swimming in a fish tank; a man riding a bicycle with an attached trolley to transport food to a well-known Swiss retailer; a supermarket's vegetable aisle and fish counter; shoppers; and young people enjoying a barbeque on a rooftop terrace. This sequence of summer images conveys youthfulness, naturalness, freshness and urbanness. In addition to the visual encounter, some ambient but fast paced music forms the background to the video, and a youngish man with an American accent shares UrbanFarmers' mission. He starts by asking:

What if the food you eat every day is grown right in your neighbourhood?
Wouldn't vegetables grown across the street taste better than those from across the ocean? And what farmer in his right mind would ever choose to stick his produce in a shipping container for a month?

If we pause here and consider what we are not seeing or hearing, it becomes apparent that no technical equipment and infrastructure is displayed other than parts of the greenhouse. We see some trucks (belonging to the retailer), a container crane and shipping containers, but learn by way of the question posed in the beginning of the video that this last image is to be connoted negatively, since no farmer “in his right mind” would “choose to stick his produce in a shipping container for a month”. This contrasting portrayal of globalised food production and supply (in the form of shipping containers) versus local food production assists UrbanFarmers in creating an image of the company as one that is dedicated to producing local foods that are fresher due to the reduced travel time. Additionally, the absence of any portrayal of technical devices in the video emphasises the naturalness of the food produced and contrasts with my experience of the tour described above.

Once the film ends with the company’s slogan “UrbanFarmers: The fresh revolution”,⁹ visitors see the home page of the website where UrbanFarmers states:

We all want fresh food

Fresher food is better food. For too long, urban agriculture has been a hobby amongst a few dedicated enthusiasts. Introducing UrbanFarmers: we provide systems and solutions that enable enterprises to grow the freshest vegetables and fish in your city reliably, and on a large scale.

This statement describes the efforts of civic urban farmers as a “hobby” that is professionalised and upscaled by UrbanFarmers, thereby enabling entrepreneurs and established businesses to draw on the core ideal of producing food locally but in an organised, systematic, reliable and large scale manner that goes beyond community efforts of growing food together. But what is transformed in this translation from community-based to entrepreneurial urban farming? The company’s entrepreneurial

⁹On another page the visitor reads the slogan “Real freshness means food is grown where it’s eaten.” This focus on the freshness of the produce, as conveyed by the various visual and textual descriptions on the website, is nothing new to food studies scholars of novel food and food technologies (Freidberg, 2010). However, previous research on fresh food emphasises the shifting notions of what fresh means at different points of time. I will explore this question in relation to UrbanFarmers in my discussion section.

vision involves a small-scale re-industrialisation of urban farming. However, this latter part is not made immediately visible to website visitors - although it is visible to visitors at the actual site of production. This is notable as the promotional discourses associated with the start-up foreground the image of fresh, local, and large-scale, but not industrial, food production. However, if website visitors search for more information on how the start-up operates and how its technology 'works', they can easily find pages of the UrbanFarmers website that detail the company's technical "core capabilities" (such as aquaponics, system design, UF controller, UF node, UF brand) and infrastructural 'solutions' (UF bolt-on system, rooftop farms, UF box). These 'technical' sections of the website describe urban farming as a process that, with the help of proprietary technologies such as the UF Controller, can be monitored, recorded, controlled and automated and, by extension, require less human monitoring and controlling.

How is sustainability presented in this kind of urban farming? The word 'sustainable' features prominently in UrbanFarmers' self-description of one of its core capabilities: the aquaponics technology, which is introduced on the website as "A Truly Sustainable Solution for Growing Fish and Vegetables in closed-loop Systems" (caps in original).¹⁰ An analysis of the 245 word description explaining this statement reveals that what renders this technology and its use sustainable in UrbanFarmers' view is: significant water savings; no use of arable land; less use of fossil fuel-based fertilizers; no use of pesticides or herbicides; and no use of antibiotics (for fish farming) due to lower stocking densities and "great water quality". UrbanFarmers, then, emphasises how aquaponics requires fewer natural resources, presenting this 'efficiency' as an important contribution to creating a sustainable food system.

UrbanFarmers presents itself and the urban agriculture systems it sells not only as sustainable and reliable, but also as cost effective. According to the UrbanFarmers website, this cost-effectiveness is achieved through the start-up's technical core capabilities. For instance, the UF Node, a "proprietary operator dashboard and cloud-

¹⁰ Available at <https://urbanfarmers.com/technology/aquaponics/> (accessed 3 September 2017).

based operations data solution”, is described as “a ‘mini-ERP [Enterprise Resource Planning] system’ for our farm operators enabling them to reduce cost in administration and overhead as well as streamline operations”.¹¹

Summarising the benefits of its technology, Urban Farmers concludes: “Overall, the combination of aquaculture and hydroponics in Aquaponic technology is seen as a highly sustainable and resource-efficient production method compared to stand-alone aquaculture or hydroponics” (emphasis removed). This presentation of aquaponics considers sustainability primarily in terms of ecological and economic efficiencies. The combination of ecological and economic efficiencies as an ideal pairing to achieve sustainable development is generally discussed in terms of ‘eco-efficiency’ in the corporate context (World Business Council for Sustainable Development (WBCSD), 2000). Eco-efficiency is defined as:

[T]he delivery of competitively-priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life-cycle to a level at least in line with the earth’s estimated carrying capacity. In short, it is concerned with creating more value with less impact. (World Business Council for Sustainable Development (WBCSD), 2000: 4)

UrbanFarmers’ depiction of aquaponics resonates with this definition, the significance of which will be considered in more detail in my discussion. However, I will first consider the food futures presented by the other two start-ups.

CombaGroup

CombaGroup, founded in 2013, is a start-up based in Molondin in the French-speaking part of Switzerland. The start-up describes itself as “a Swiss agro-tech company, offering innovative solutions and aeroponics production systems for the food-service and

¹¹ This quote is taken from UrbanFarmers’ website, <https://urbanfarmers.com/technology/uf-node/> (accessed 10 December 2017).

processed-salad industry”.¹² The aeroponic production method is a way to grow lettuce in greenhouses with the plant’s roots suspended in the air and regularly sprayed by an irrigation robot with the necessary water, oxygen and nutrients. This, in entrepreneurial terms, is the company’s core capability. When I visited the start-up in March 2017, I had the opportunity to see its prototype greenhouse, ask questions and learn more about the workings of CombaGroup’s patented mobile aeroponics technology, as well as the company’s patented system to optimise spacing of the lettuce during growth.

The similarities to UrbanFarmers are apparent in terms of the set-up (such as the greenhouse), the technology-enabled production method for vegetables (aquaponics versus aeroponics) and the revolutionary ambitions (a “fresh revolution” and “aeroponics revolution”, respectively) that target food production and distribution systems with the suggestion - in CombaGroup’s words - “to relocate all their production assets next to the consumption centers”. However, the companies differ in aspects of their self-presentation. UrbanFarmers connects its entrepreneurial activities to civic urban farming initiatives that may appeal to young urbanite food consumers - so-called political or ethical consumers (Lewis and Potter, 2011). In contrast, CombaGroup’s self-presentation speaks primarily to the businesses it seeks to win as its customers and/or potential investors. Nonetheless, CombaGroup addresses consumers’ potential food concerns when highlighting that, with the help of its technology, the bagged lettuce is “healthier” as it contains “no pesticides”, “no fungicides” and is not affected by “chlorinated washing”.

In my interview with one of the start-up’s members, they described the start-up’s aims in terms of sustainable food production and distribution:

We have to stop having food that travels thousands of kilometres - it takes days before reaching the consumer. It claims to be healthy, but it’s full of pesticides, it requires a lot of transportation. So, really what we want with the technology is to

¹² https://docs.wixstatic.com/ugd/4d8b84_be8da7bb948c43e7b6e5d39b444fe768.pdf, as linked from the main website (accessed 4 September 2017).

simplify the value-chain and make it more sustainable, for the planet and for the consumer. (Interview, 8 March 2017)

Additionally, the sustainability of CombaGroup's food production and distribution methods is highlighted on its website, which presents the bagged lettuce produced with the company's proprietary technology as "eco-friendly" due to "reduced water consumption" and "no waste". These advantages were also described in the interview and during my visit to the prototype greenhouse. Similar to my visit to UrbanFarmers, the visit to CombaGroup conveyed the start-up's focus on its proprietary technology and infrastructural set-up, rather than food. This impression was intensified by the fact that I was visiting a prototype greenhouse that was not yet fully operating. Furthermore, this high-tech set-up, devoid of food at the time of my visit, posed a stark contrast to the surrounding Swiss countryside, which is predominately farmland.

In CombaGroup's presentation of the benefits of its agtech innovation to producers and consumers,¹³ the company states that its technology results in cheaper, fresher, healthier and eco-friendly food, as well as improved logistics. Presumably, the end product (lettuce) will not be cheaper for consumers but it will be cheaper to produce and hence cheaper for the producer or grower adopting this method. As summarised by CombaGroup on its website: "for producers, this means increased ROI [return on investment], differentiated products & marketing edge". Or as the company describes its business purpose on the crunchbase data platform:

CombaGroup ... is developing a cost-effective and environmentally-friendly solution for growing high-quality lettuce with a longer shelf-life. CombaGroup combines technological advancements in logistics, agronomy, climate control and automation to yield up to 70x productivity gains and deliver a revolution in the supply of lettuce to packagers.¹⁴

¹³Presentation available for download from the CombaGroup website, https://docs.wixstatic.com/ugd/4d8b84_be8da7bb948c43e7b6e5d39b444fe768.pdf. See slide 4, 'Product - Key Benefits for Producers & Consumers' (accessed 4 September 2017).

¹⁴See <https://www.crunchbase.com/organization/combagroup> (accessed 22 December 2017).

Similar to UrbanFarmers, CombaGroup emphasises both ecological and economic efficiencies.

It is useful to consider UrbanFarmers' and CombaGroup's descriptions of and claims about their systems' and technologies' sustainability as sociotechnical promises. These promises describe the potential of these new technologies and play an important role in fostering sociotechnical imaginaries around novel foods and their production (Martin, 2015). At the same time, these promises are not exclusively connected to the future but draw on existing frames of sustainable food production/consumption as advanced by AFNs and taken up and discussed in the food policy arena. However, while drawing on existing frames, these are re-evaluated and re-defined by the start-ups. In my analysis of the two start-ups, I have identified three re-evaluations and re-definitions: what *local* food is and how it is evaluated; what *fresh* food is and how it is evaluated; and what *sustainably produced* food is and how the companies evaluate sustainability. I will return to the redefined frames in the discussion section of this chapter. First, however, I will discuss one additional start-up whose promotional strategies focus on sustainable food consumption, rather than production or distribution.

Essento

Essento is a Swiss start-up to which I was first introduced in Spring 2015 by students attending my Masters-level seminar at the University of St. Gallen, 'Food Politics and the Limits of Markets'. As part of the seminar, I asked the students to study an organization or initiative that politicises food. While I had envisioned that students would research mainly non-profit activist organizations such as Slow Food or alternative food networks, one student group chose to focus on the start-up Essento, which develops insect-based foods.¹⁵ My students were familiar with the start-up because the two Essento founders studied at St. Gallen.

¹⁵I would like to acknowledge the explorative study of insect eating by former students K. Castrejon, L. Brem and M. Job that they described and analysed in their seminar paper written as part of the 'Food Politics and the Limits of Markets' Masters course in Spring 2015. Their study is

In some ways, Essento is similar in its activities and ambitions to food activist organizations. Initially, one of the start-up's main efforts was to popularise locally the idea of eating insects, a culinary practice common in African and Asian countries, and to lobby for a changing Swiss food safety regulations that restricted insect-based foods to the pet foods market. On 1 May 2017, food safety regulations underwent a revision, and now insect-derived food products containing three types of insects (crickets, grasshoppers and mealworms) are permitted in Switzerland. In August 2017, Essento launched its first line of mealworm-based foods – insect burgers and insect balls – that are sold (at the time of writing) in selected branches of the Swiss retailer Coop. Essento also plans to sell whole insects through its webshop (delicious-insects.ch).

Essento's website (available in German only)¹⁶ is divided into four pages: "insect facts", "sustainability", "FAQ" and "Essento education". Clicking on "insect facts", visitors read: "The food revolution is here! The alternative protein source of the future is now available as a food product (*Lebensmittel*) in Switzerland. Here is a list of advantages of edible insects". Scrolling down, visitors learn about three main benefits of eating insects. These state that the benefits of eating insects are that it is: good for the planet, great for health, and tasty for the palate.

Each benefit is described with the help of infographics and supported by references to academic studies or a report by the United Nations Food and Agricultural Organization (FAO). This visual rendering of information enables a quick understanding of the "facts". For instance, a graphic in the section "good for the planet" compares the potential impact of different animal protein sources on global warming. Insects (in this graphic, mealworms) are depicted as good for the planet because of their relatively low

based on an interview with a member of Essento and an auto-ethnographic study of purchasing, cooking and eating mealworms and grasshoppers that they bought in a pet shop in St. Gallen, as well as taste-testing insect bars they had ordered online.

¹⁶ Where I cite text passages from Essento's website, <https://www.essento.ch> (accessed 7 September 2017), I have translated these from German into English.

production of greenhouse gases compared to the gases emitted in the production of cow's milk, pork, poultry and beef. A second graphic in the same section shows that insects, compared to beef, are far less resource-intensive in relation to water and feed. Additionally, a higher percentage of the whole animal is edible; in the case of insects 80%, compared to 40% in the case of beef. In sum, the start-up emphasises that insects require less natural resources for a higher edible yield.

Essento's definition of sustainability in terms of ecological efficiency resembles that of the two previously discussed Swiss food-start-ups. However, Essento's focus on ecological efficiency is not linked with economic efficiency. In other words, Essento does not mention or discuss any potential (long term) cost savings that a shift from raising cattle to breeding insects could entail for food production. In that respect Essento is not foregrounding the potential 'eco-efficiency' of insect-based food production. This silence about economic efficiency, its relationship to ecological efficiency and the potential eco-efficiency is likely related to Essento's values-based orientation in its business practices. This values-based orientation is clearly expressed in the start-up's mission listing five core principles: more than profit, species-appropriate animal husbandry, global/local, sustainable quality and awareness.¹⁷ The first principle, in particular, indicates that the generation of revenue and profit is balanced against the other principles listed. In an interview with one of the company's core members, the member compared Essento to other insect-based food start-ups, problematizing profit-driven entrepreneurship:

There are companies in this area stating: "insects are a billion dollar market!"

Upon hearing that I ask myself, did they not fully understand the issue? This is about so much more (see the FAO report)! This is about inducing profound change [in the food system] and not about finding other ways to earn money. This is the challenge. Or the moral question that I also ask myself repeatedly: Am I doing the right thing? What can I do differently to contribute more towards systemic change? (Interview, 20 March 2017)

¹⁷ See <https://www.essento.ch/unsere-mission/> (accessed 5 January 2017).

Two additional factors are likely to have contributed to Essento's focus on ecological over economic efficiency: the legal context at the time; and the forms of investment that the start-up accepted. As outlined earlier the start-up's initial task consisted of advocacy for future insect consumption, which required lobbying for changes in the Swiss food safety regulations. Initially, then, advocacy rather than food production played a central role in the organization's daily activities. Thus, Essento was initially not in a position to produce and sell insect-based foods in Switzerland, which may have hampered investors' interest in the company and its innovative products. In the interview it also became clear that the founders were actively looking for an investor or group of investors who would share their core values and long-term goals focused on sustainable food production and consumption rather than financial gain.

What is 'sustainable' in sustainable agtech and foodtech innovation?

My analysis of three Swiss start-ups' promises to produce and sell sustainable foods shows that in all three cases sustainability is defined in terms of ecological resource efficiency. Reduced use of water, soil and transport or the reduction of food waste are variously presented as contributing to a sustainable food system. In the case of UrbanFarmers and CombaGroup, ecological efficiency is also presented as a means for companies to save food production costs via use of new technologies in the production of food. These technologies are framed not only as reducing the use and depletion of natural resources, but also as economically optimising food production. In other words, using less soil, water, transport and intermediaries present a potential for saving costs that conventional food production does not offer. These savings have to be considered by producers, however, in relation to the initial cost of adopting and implementing the new means of production and distribution.

Whereas Lupton's (2017) study of how 3D printed foods are depicted in online news sources found efficiency and sustainability to be two separate promissory themes, my analysis shows that, in the three selected Swiss agtech and foodtech start-ups, the promise of sustainable food is closely connected with promises of ecological and/or

economic efficiencies. I suggest that the entanglement of these promises can be explained by the different audiences addressed in the media reportage Lupton studied and the promissory self-presentations of start-ups that I examined. While the former is often focused on an audience of interested publics, the latter is largely geared at conveying the start-ups' visions and products to investors and publics (and potentially media) simultaneously. I suggest that examining these self-presentations on start-ups' websites, complemented with additional ethnographic material and interviews, enables an analysis of "techno-economic assumptions" (Birch, 2017) that underpin the sustainable agtech and foodtech technologies discussed in this chapter. Such an analysis can unpack how economic imperatives structure start-ups' self-presentation and the values they build into their agricultural and food innovation.

Conclusion: Entrepreneurial activism and the redefinition of sustainable food

What does this mean for alternative food networks? Goodman et al. (2014: 6) state that "[o]nce food politics is caught in the maze of competing definitions of the 'real', or the 'local' the game is already lost." My exploratory analysis of entrepreneurial visions of sustainable food futures complicates this picture. Competing definitions of sustainable foods might not necessarily mean that the game is lost, but rather that the rules of the game are adapted. Further research would be required to more systematically explore the different practices and situations in which sustainable foods are negotiated.¹⁸ Ideally, such studies would attend to the network infrastructures – digital or non-digital – and the technological, economic, scientific, and environmental assumptions underpinning these infrastructures and the relations they enable and constrain.

My initial findings lead me to suggest that promises by agtech and foodtech entrepreneurs resemble those of food activists. Start-ups often adopt communication strategies similar to those of alternative food networks and NGOs, particularly in

¹⁸In the case of ethical foods this has been explored for various settings including retailers (Lewis and Huber, 2015; Sexton, 2016; Stephens and Ruivenkamp, 2016; Yates-Doerr, 2015) and media and food industries (Phillipov, 2017).

relation to (the scale of) current environmental issues and how particular forms and materials of food production, distribution and consumption are posed as responses to environmental problems. To the extent that these communication strategies resemble those employed by food activists, the commitment with which some food start-ups seek to change the way we produce, distribute and consume food leads me to frame their promissory and promotional efforts as a form of entrepreneurial activism.

However, the solutions proposed by food activists and entrepreneurial activists differ. In the case of start-ups, they tend to be focused on technological solutions for environmental problems (Sexton, 2016; Stephens and Ruivenkamp, 2016; Yates-Doerr, 2015). Additionally, entrepreneurial efforts are limited by their dependency, in the majority of cases, on financial investments to pursue further research and development. Procuring these investments requires start-ups to show their financial viability to potential investors. In this context, they may opt to present their environmental ambitions as a business opportunity by pointing to economic efficiencies, as discussed in this chapter: good for the planet, good for health and good for the company's development. Essento presents an interesting case of entrepreneurial activism as the start-up's founders carefully negotiate the organization's investment, impact and growth trajectory guided by their core values. Ultimately, however, the level and type of financial investment start-ups require to realise their business idea limit their ability to ignore financial imperatives tied to particular forms of investments, such as venture capital.

It is here, at the nexus of the financing of start-ups and the realising of envisioned food futures, where sociotechnical promises play their key roles of attracting investors' (and others') interest, mobilising resources (in this case, investments), and bridging across otherwise distinct dimensions (cf. Borup et al., 2006: 285-286). This is nicely illustrated in Stephens and Ruivenkamp's (2016: 349) study where, using the example of cultured meat, they argue that

[w]hen successful, the affordances of the promise and ontological status of IVM as meat in these images have social and material impacts. They make IVM reputable and attract money, which in turn shapes innovation practices, which in turn will reshape the imagescape once again.

My ongoing research project investigates this shaping of innovation practices and how, in turn, these practices will reshape what sustainable food is, how it will be produced and what will be consumed under this banner. In this chapter, my exploratory analysis suggests that food innovation fostered in particular settings and underpinned by strong techno-economic assumptions is not focused on mainstreaming alternative food networks' goals but rather redefines what constitutes 'sustainable food' and how it can be achieved.¹⁹

This redefinition of sustainable food by entrepreneurial activists is structured by a productionist ethos, favouring technological solutions that achieve economies of scale. If, due to its potential scaling effects, such an understanding comes to dominate food policy discussions as the most viable solution to achieve food security, it has the potential to become more politically preferable than food systems approaches to sustainable futures. This is especially the case when the productionist ethos is presented as solving a key concern in contemporary food policy debates (and beyond): that is, sustainability. Ultimately, I argue in this chapter that it is important to study the process of redefining what is sustainable food production and consumption, the situated practices and tools of redefining and their potential implications, as these have the potential to shape collective ideas of how best to achieve food security. Based on my explorative research, I suggest that entrepreneurs privilege the use of novel technologies over other potential solutions for achieving food security by presenting them as both desirable and attainable. Understanding these entrepreneurial visions is vital, as they

¹⁹ The case of Essento highlights that other trajectories are possible but require careful negotiation of an organization's development, or may even involve deviation from the standard trajectory developing a business idea into a profitable company.

have the potential to significantly shape the framing of collective ideas of how to achieve food security and sustainable food futures.

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