Education for a sustainable agri-food system

IMPACT
for transition in agro & food

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Contents

Preface

Food and the city has never been a more urgent theme than today, and The European Union 's priority to commit to innovation in this field will certainly enhance its economic and external strength and improve its competitive position in the world of food and life sciences. Europea Netherlands held a seminar on this topic in May 2016, during the Dutch EU presidency.
To be part of this international endeavour, the Netherlands need to strengthen the digital market, support innovation in the internal market, boost domestic policy reforms, and embed their knowledge and skills in a European society that challenges itself and continues to innovate. The Netherlands is a global player in the agro, food and horticultural sector and a major player in the export market of agricultural products. This sector is one of its main economic pillars. New knowledge is being developed as we speak, which is also an export product in high demand, providing sizeable employment. This is only possible because the sector is innovative and remains up-to-date. The peri-urban areas in the Netherlands (both urban and rural areas) are characterized by high population density. This necessitates thinking about manufacturing, food, logistics and water management (circular economy).
Land-based education and life sciences in the Netherlands may appear to be specific, yet it is broad too: the primary sectors are included, as well as the manufacturing businesses and services associated with it. Participants learn to work in an innovative sector in a society in transition, bringing together multiple disciplines (cross-overs) and stakeholders.
This education is practical and has a strong connection to the industry.
During the Europea seminar five professorships, installed by the ministry of Economic Affairs, focused on transitions in the agro and food sector. The five professorships are posted at the Dutch Agricultural Universities of applied sciences, including teacher education for sustainable connected learning and development for professional education and business communities.

The seminar and this publication with articles was made possible by the financial support of the Ministry of Economic Affairs, the OVP-Plant programme, the four universities and Europea Netherlands. With pleasure we offer this collection of articles, written on behalf of the Europea seminar held in Rotterdam, May 2016.

Madelon de Beus
Board Europea Netherlands
Director Aeres University of Applied Sciences Wageningen

IMPACT: a common professorship programme for transition in the agri and food domain

A short introduction in the IMPACT program

The post war, on production-oriented agri-food system, is under increased pressure. Although the post WWII modernisation was very successful in providing food security (its initial aim), it has also lead to overproduction, severe environmental degradation, exhaustion of natural resources, decoupling of producers and consumers and severe social concerns about public health and animal welfare. These problems cannot be solved by altering the current agri-food system. In contrast, the current system needs a transition from an on production oriented system to a more sustainable one with more respect for the environment, humans and farm animals.
These agri-food crises form the backdrop of the IMPACT professorship programme. The IMPACT programme embodies a series of five professorships (of applied sciences, 'lectoraten' in Dutch) focusing on transition in the (Dutch) agri-food domain. The IMPACT programme is financed by the Dutch Ministry of Economic Affairs, for four years (starting from 2015). The four professorships are hosted by five different Dutch universities of applied sciences with a focus on agri-food: HAS University of applied sciences (Den Bosch), Van Hall Larenstein University of applied sciences (Leeuwarden), Inholland university of applied sciences (Delft), Aeres University of applied sciences Dronten and Aeres University of applied sciences and teacher education Wageningen

The IMPACT professorship programme focuses on understanding the transitions needed in the agri-food domain. Central questions: what makes transition in the agri-food domain? Which transitions are needed? What is needed to change the dominant system and – in the end – foster the development of a more sustainable future? What does it require of current and future professionals? Does it presupposes different thinking, learning? What needs to be changed in the current educational system?

Despite united by a shared objective and questions (as introduced above), each of the five IMPACT professorships has its own particular research focus. In this brochure we like to share these five different stories with you. Aside from sharing our research, we like to put our challenges into a European perspective to start the debate about what these research projects mean for learning and tomorrow's training and education.

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1 Transformative business for agrifood transition: implications for learning

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The agrifood system is under increasing stress. On the one hand, developing economies and soaring population numbers heavily increase the demand for food, and for animal protein in particular. On the other hand, current intensive agriculture, such as the dominant type in the Netherlands, is associated with climate impacts, impacts on biodiversity and, on a more local scale, increasing societal concerns about human health (zoonoses, multi-resistent pathogens), soil depletion and animal welfare. These mounting systemic pressures lead to increasing doubts about the sustainability of the current agricultural regime, and to calls for transition towards a more sustainable agricultural practice. How can business model thinking help us towards more sustainable agriculture?
In thinking about sustainability, the triple bottom line is often used to distinguish profit only from people, planet and profit. One might even argue that some sustainability activists hardly pay any homage at all that the profit part of the triple bottom line also is the main pillar to our economies. In that sense, profit cannot be denied from a business perspective. Hence also some recent attention to looking for business models that have the potential to transform current economies. But to what extent can generic business model approaches contribute to transformative business? In this paper we suggest that thinking about new business models requires a broad value orientation as well as a reflexive orientation towards development.

Business model thinking and learning

The CANVAS model (Osterwalder, Pigneur, & Tucci, 2005) is perhaps the best known conceptual approach to business modelling. Central to this approach is that business involves offering a service or product with a value (the value proposition) for a customer. The value of the product / service is expressed in financial terms. The underlying idea is not to design a business at the drawing board and the implement it, but rather to immediately implement it in the smallest possible way and then iteratively build further. The CANVAS model is a generic approach. The question then is, to what extent is it useful to conceptually produce transformative businesses.
No conceptual barriers exist within the CANVAS approach that prevent conceiving of transformative business. However, as we argue, two aspects give it a dominant orientation towards the current regime. First, by conceiving of value in financial terms, it focuses on values that can be monetised. When thinking about transition, however, we think of a societal transformation that also results in re-valuating products and services. For instance, in the still reigning fossil fuel regime, we conceive of gas reserves as being fully monetisable. However, when we take a transition perspective, we would denote such reserves as a “carbon bubble” in the energy economy (Fulton, Spedding, Schuwerk, & Sussams, 2015). So, a broad orientation to value is necessary, because in addition to being able the monetise value within the current regime, it is even more important to be able to monetise value in future regimes.

From a learning perspective, a broad orientation towards value stresses the importance of negotiation of the meaning of this value (Beers, Boshuizen, Kirschner, & Gijselaers, 2006). Indeed, in the traditional case all meaning of value is in fact translated in financial terms, and the negotiation of meaning therefore, transitionally is reduced to bargaining. In contrast, a broad value orientation also implies that certain types of value will be exchanged

without any financial means changing hands – sometimes innovators earn legal exemptions because of the trust they have earned or the promises they make.
Second, while the CANVAS model does feature an iterative development process, it does not explicitly conceive also as the business context to change. In absence of an explicit conceptual orientation, it implies, as a default, a more or less stable societal context. However, in transitions, we not only conceive of the societal context as structurally changing, moreover, we might want to reflexively accelerate this change. Therefore, a transitions-oriented business model needs to conceive of a changing societal context and it needs a reflexive orientation to that context to be able to accelerate change.

From a learning perspective, reflexivity is often associated with a deeper form of reflection, concerning not only the extent to which current actions are sufficient for reaching certain goals (reflective orientation), but also reflection on whether underlying goals and values have changed or should change (reflexive orientation; Beck, Bonss, & Lau, 2003; Hendriks & Grin, 2007). (This is not to be confused with the notion of reflexivity that is more dominant within transition science, that is, Beck's notion of reflexive modernity, Beck, Bonss, & Lau, 2003; Beck, Giddens, & Lash, 1994, and the associated notion of reflexive governance, Grin, 2006).
In sum, a transformative business model approach should take into account a broad value orientation as well as a reflexive orientation towards change. In this paper, we report on an initial study in which we applied our transitions-oriented conceptual approach to business models to an innovation case in the Dutch greenhouse sector.

Methods

We conducted a series of exploratory interviews with greenhouse growers and a few experts in the Dutch greenhouse sector. This sector consumes 10% of the total Dutch yearly natural gas consumption. As a transition-oriented business model, we therefore focussed on climate-neutral greenhouse production. We selected interviewees on the criterion that they were about to, or has just, invested in their greenhouses. The interview concentrated on how they made their investment decisions and what various criteria they used.

Analysis was based on a business model conceptualisation with four elements (cf. Proka & Loorbach, 2015; Stahler, 2002):

- The Value Proposition that clarifies what value is embedded in the offerings of the firm, in terms of people, planet and profit ;
- The Product or Service which fulfils the value proposition and generates the promised benefit;
- The Architecture of value that lists the partners and channels through which value is produced and delivered; and
- The Revenue model, which is the bottom line of the business model: it translates the two former dimensions in cost and revenue flows.

Additionally, we included a reflexivity orientation in our analysis. Here we focussed on the changing societal context of the business model, based on the premise that, from a transitions perspective, transition implies a structurally changing context, and it also implies that transformative business models should be able to accelerate change by strategically connecting to their societal contexts. Based on a the work of various authors writing about reflexivity and transitions (Hendriks & Grin, 2007; Van Mierlo, Arkesteijn, & Leeuwis, 2010;

Van Mierlo, Leeuwis, Smits, & Klein Woolthuis, 2010), we selected the following dimensions for reflexivity:

- Discourses: The main current discourses in its societal context and their (dis)alignment with the business model.
- Relations: The relations outside the business model (i.e., excluding the partners within the business model) and how they change due to its development.
- Practices: Practices outside the scope of the new business model that offer potential obstacles and / or opportunities to its further development.
- Institutions: The new business model's changing relation with existing rules, regulations and customs, and the possible ways in which it might influence them.

Note the subtle but important way in which the relations in the reflexivity framework are different from the relations inherent to a business model's value architecture, in that the first concern relations with stakeholders not included in the value architecture. For each category in the two above frameworks we coded the qualitatively different instances of that category present in the interview data (Strauss, 1987).

Results

Results suggest that growers do see the value proposition in climate-neutral greenhouse produce, in various ways. Interviewees associate the idea with upcoming food trends such as local-for-local production and some recognize the added value of energy-neutral production, both in financial terms (lower energy costs) and societal value (reduced impact on climate change).

Regarding value architecture, current production processes in many cases offer advantages compared to business-as-usual greenhouse production. Indeed, interviewees mention a host of technological options that reduce fossil energy use, such as innovative types of greenhouses, geothermal heating, ground-source heat pumps, different types of glass, and innovative growing techniques. However, the extent to which growers manage to produce in an actually climate-neutral way remains limited. Furthermore, current value chains (growers sales trade retail / food services) lack the provisions to distinguish climate neutral products, and no recognizable demand exists.

Currently, the only related product / service therefore consists of providing energy (heat) from renewable sources (geothermal), no greenhouse products are currently offered as climate neutral. In terms of reflexivity, various interviewees see climate neutral production not as a goal in itself but as a new connection of their company to society, or as a way of societally responsive entrepreneurship. This clearly suggests that they see connections between climate-neutral production and outside discourses. In terms of changing relations, some have explored new, unusual partnerships, for instance by contacting Greenpeace. However, many also report how current relations influence the potential to innovate their businesses. Banks only concentrate on the financial part of the business, and they take no position for or against climate-neutral production. Many hope to receive more support from governments and sector organisations, for instance lobby-work for energy-neutral production, but as of yet these organisations do not take a specific stance.

On the institutional side, the results suggest that especially processes involving building permits have become more difficult in recent years, and more so for especially innovative projects, such as those greenhouse concepts that are especially energy efficient or projects involving geothermal heat. The underlying problem is that some municipalities have merged and have laid off some personnel, with the result that there are fewer greenhouse sector specialists than there used to be, with less sectoral knowledge and fewer opportunities to direct the generic institutional frameworks to the specific issues of the greenhouse sector. The resulting impression is that changes outside the direct scope of the greenhouse sector have adversely influenced the flexibility of, for instance, building permit processes, and more so for greenhouse growers with innovative plans, such as building specific types of greenhouses or using geothermal heat.
Finally, the analysis of related practices suggests that the availability of CO_2 as fertilizer is a bottleneck in making the sector climate neutral. Many growers now use Combined Heat and Power installations to produce their own CO_2. Without such technology, they need to find CO_2 elsewhere.

Discussion

In this paper, we introduced an innovative approach to business models to address the specifics of sustainability transitions and applied it to the case of climate-neutral greenhouse production in the Netherlands. Our results suggest that, as of yet, there is no specific business model of climate neutral greenhouse production. While the value proposition is clear, and while the technological options appear to mostly exist, there currently is no market for climate-neutral produce, that value chains do not distinguish such produce, and, hence, there is no specific revenue. In other words, while it is possible to buy climate-neutral produce from the Netherlands, there is no way of knowing when you do so. Additionally, our results indicate that some growers are reflexively trying to build new relations, but especially the government, sector organisations and banks remain mostly neutral to the idea of climate-neutral production, and given the current institutional context, the current dominant regime, this "neutral" position can be argued to favor business-as-usual. In other words, while the idea of climate-neutral production appears "to have legs", it can be connected to outside discourses, it also requires further development, especially in the institutional sense.

Reflecting on these results, it appears that the two conceptual additions that we introduced – a broad value orientation and a reflexive orientation towards societal change – both had added value in the analysis in terms of giving depth to a business model that is yet to be. First, the broad value orientation was useful in focusing on non-monetary value, insofar it was recognised by the entrepreneurs (note that in the interviews, we did not introduce climate-neutral production as a value). Second, the reflexive orientation helped to identify both a few opportunities (especially building new relations with specific unusual suspects) and obstacles (in terms of positions and institutions).
This also underscores the multi-actor complexity inherent in developing transformative business models, which clearly reflects the actor complexity of transitions in general. In future research, we hope to further develop our approach by applying it to other business models and testing its practical usefulness.

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2 Urban food initiatives: between big issues and small solutions

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If we want a rich and varied urban existence, we must embrace food in its totality; not just in order to live more ethically, but to engage with its manners and sociability. (Steel, 2009: 321)

Introductory Remarks

Similar to many other articles in which the city is pivotal, this essay also opens with the observation that the global growth of the urban population is skyrocketing. The increase in the amount of earthlings living in urban regions is about to double in some expectations during a time span between the 1970s and mid-21st century to three quarters of the entire world population. This percentage means that the urbanization on a world scale will be the same in a few decades' time than the percentage of Dutch people who are currently living in urban environments (PBL, 2015: 6). This "dutchification" of planet Earth will bring anticipated as well as unexpected problems and opportunities. With respect to city life major issues concern, among others, living conditions (safety, crime, drug-related problems, unemployment, lack of social cohesion, etc.), housing problems, as well as socio-economic and socio-cultural segregation between the wealthy and healthy on the one hand and those dealing with lower income and health status on the other. Simultaneously, cities are hotbeds of creativity and innovativeness in which good ideas are tested and diffused that pave the way to new directions and outlooks. Generally, urbanization is both problematic and promising; growing cities cause problems and reproduce unsustainable structures and systems ("tradition towns") while at the same time cities do have a growing role to play in enabling, encouraging and exemplifying transitions to greater sustainability: socio-economically and environmentally ("transition towns") (for an early study on sustainable cities, see Rees & Wackernagel, 1996, and for recent papers, see e.g. Bayulken & Huisingh, 2015 or De Jong et al., 2015).

More directly related to food, one of the most profound foreseen challenges is about how to provide enough food to all these urban dwellers in sustainable ways. One of the big issues involved here is that producers of food become only consumers as soon as farmers leave the countryside to try their luck in the cities. As a result, the ratio of food2 producers to consumers is further declined, and the many-sided gap between production and consumption is also expanded by this exodus Satterthwaite et al., 2010; Steel, 2009). Another big issue is the nutrition transition that displays itself throughout the world in modern times (Popkin, 2001). This signifies the tendency that urbanization and rising incomes go hand in hand with increased rates of animal protein consumption (meat, dairy, eggs). Apart from animal welfare, health as well as food security issues related to lavish animal-based food consumption, the tendency to eat more animal-based and less plant-based foods causes a worrisome increase of the ecological foot print because the production and consumption of animal-based food products are among the most ecologically burdensome of the food range (Dagevos, 2016).

The unprecedented process of urbanization confirms and reinforces problematic issues that characterize the contemporary world of food. The growth and urbanization of the world population underscore that food-related issues such as obesity and overweight, animal welfare, food security, food waste, greenhouse gas emissions, biodiversity loss, land degradation, deforestation, and overfishing, or cardiovascular diseases and diabetes, become

ever so manifest and urgent. Poignant enough, at the very moment that a substantial increase in food production is required to feed the growing world population, serious questions may be raised about the dominancy and durability of the mainstream mode in the agrifood complex that is deemed to realize this production growth. Key words of this prevalent "productionist" paradigm are economies of scale, cost leadership, export orientation, globalization, and growth.

It is beyond the scope of this essay to delve much deeper into various reactions voiced in this discourse – ranging from techno-optimism to fundamental re-orientations of the entire food system. Our focus here will be on those who do not fall victim to despair when confronted with all the just-mentioned big food issues. On the contrary, we concentrate on food initiatives and food consumers who seem to personify the words of the Welsh thinker Raymond Williams: "To be truly radical is to make hope possible rather than despair convincing." We are particularly interested in those who are concerned with finding small solutions to the big issues involved. Paying attention to expressions of (pro)active and autonomous consumer-citizen power from the bottom up relates directly to the concept of the so-called "energetic society," as we have known it in the Netherlands since a few years (Hajer, 2011). Urban food initiatives are examples of people taking responsibility and control. The grassroots perspective of the energetic society looks at what citizen-consumers are doing themselves in combination with the entrepreneurial initiatives which enable them to consume in more sustainable and socially responsible ways. In other words, the mushrooming urban food projects in many cities all over the world, which take such diverse forms as urban farming, food cooperatives, farmers' markets, community gardening, roof gardens, or food festivals, may be considered as "means of empowering those who appreciate the significance of the challenges of moving toward a more sustainable future and choose to be part of the process." (Blanco & Mazmanian, 2014: 2)

Briefly on Practice Cases in the City of Rotterdam

Following such cities as Toronto, London and Chicago, or Rome and Milan, also the city of Rotterdam has discovered food as an interesting and important topic, both economically (e.g. city branding, ethnic entrepreneurship, job creation) and socioculturally (e.g. liveability of city centres or areas, social capital, healthy lifestyles). To get a glimpse of what is happening in the city that hosts Europea 2016, the concentration in this section is on a few small-scale food initiatives in Rotterdam, and primarily makes grateful use of the empirical research conducted by Peggy Schyns (2016) and secondarily of research conducted by Erik de Bakker et al. (2013). The relationship between Rotterdam and food could be pictured in various ways, ranging from such large projects as the Market Hall to such tiny sites as the Gandhi Garden, from the establishment of a Food Council in 2013 to the urban farmers of "Rotterzwam" (who grow oyster mushrooms on coffee grounds); or by referring to the snack of Rotterdam origin named "kapsalon" (a medley of chips with shawarma, cheese and salad) as well as, at the other end of the spectrum, to the entrance of various highend restaurants in the city of Rotterdam. The three Rotterdam-based practice cases we reflect upon briefly below are also illustrative cases of the "food vibrancy" that goes through this harbour city nowadays.

Food cooperatives seem to be going through a period of revival. In many cities food cooperatives of various kinds have been established in recent times. “Rechtstreex” [Directly] is a Rotterdam-based food cooperative founded in 2013 and motivated by discomfort about the lack of insight into food production and products as well as the lack of personal (emotional) bonds with the product selection on the supermarkets’ shelves. In the meantime, Rechtstreex has spread its wings to several neighbourhoods in Rotterdam and to satellites in a couple of other Dutch cities. Rechtstreex is a form of community-supported agriculture because food products are directly bought by regional farmers. So-called area chefs intermediate between farmer and consumer by running a point of sale where customers can collect the local foodstuffs of their choice. Next to ongoing professionalization of Rechtstreex (website, delivery service, employees, etc.), effort is made to organize workshops and other excursions and meetings with a common goal of connecting consumers with the production practices of the food they eat. Rechtstreex is devoted to “conscious” food consumers. The sympathizers of Rechtstreex like to learn about food and like to know the story behind it. Personal contact and small scale remain key assets of this urban food initiative (Schyns, 2016:80-84).

The second urban food initiative is the urban farm “Uit je eigen stad” (UJES) [From your own city]. Located at former vacant parcels of land near the older parts of the harbour in the west of Rotterdam, this urban agriculture project has grown since 2011 to a size of around two hectares, which makes UJES one of the biggest urban farms in Europe. The initiators of UJES want to bring food production back to town and to create an attractive spot to experience food from farm to fork. UJES grows vegetables and fruits on its territory, keeps 1800 urban chickens, runs a food store and a restaurant. The latter is also used for workshops, lectures and other events (e.g. school projects). These activities are becoming increasingly important for the economic viability of UJES. The financial support of around forty thousand engaged citizen-consumers visiting the restaurant annually, following courses or have meetings at UJES, is vital, and cherished by the “pragmatic idealism” of the founders of UJES. In return, UJES is intrinsically motivated to connect city dwellers to food production and make them more aware of what is going on in the world of food. This driving force is interrelated with the idea that things must change in the conventional modes of food production and consumption.

Thus, reconnecting consumers with the production of food and raising awareness of the intrinsic values of food are highlighted as a welcome antidote to eating in ignorance and wasting food carelessly (De Bakker et al., 2013: 43-47; Schyns, 2016: 84-88). Food waste is at the heart of “Kromkommer” [Crooked Cucumber]. Based in the centre of Rotterdam, Kromkommer is an initiative with food waste reduction as its primary objective. By saving “crazy” vegetables and fruits from the rubbish bin and rubbish dump, i.e., collecting plant-based foods which are not sold or offered for sale due to an incorrect form, Kromkommer aims to reduce the amount of food that is wasted as a result of overproduction or wrong looks. The leftover vegetables and fruits are processed into soups which are currently sold at dozens of points of sale throughout the Netherlands, and annual sales are expected to rise to 100,000 portions. Raising awareness among stakeholders in the food supply chains as well as food consumers is addressed by Kromkommer through organizing events and campaigns,

deliver lectures, and providing an off- and online platform for a vivid community of enthusiastic supporters and partners: the so-called Krommunity. Both the soup products and the communication activities of Kromkommer radiate positivism, light-heartedness, togetherness, ambition, and stimulation (Schyns, 2016: 89-92). These values immediately connect to the first point of the concluding section.

Concluding Thoughts

The just-mentioned entrepreneurial initiatives thriving on consumer-citizen engagement have several characteristics in common. In all practice cases enthusiasm, safeguarding authenticity, pragmatic idealism, and do-it-yourself (DIY) are appropriate associations. Such salient features are combined with elements of novel social entrepreneurship ("business as unusual") that put people and the planet first rather than profit, that pursuits cooperation rather than competition, and that is more committed to better than to bigger. Taken together, such key words and principles overlap with the content that is frequently given to the notion of social innovation. Social innovation is about finding improved, i.e., more sustainable, solutions to societal problems; is characterized by grassroots initiatives from consumer-citizens or non-governmental organizations as well as entrepreneurial initiatives. Social innovation is practice-based, activist, optimistic, and rebellious. Such words are typical of practice cases of bottom-up urban food initiatives in both Rotterdam and other cities around the world. Urban food initiatives have "positive" change as their main objective, and are fueled by the idea that it is up to us to move towards the "right" direction and make the world a better place. Thus, a passionate hands-on mentality is combined with dedicated attempts to change the conventional underlying beliefs and norms as well as to reorder established relationships. Quintessential to social innovative urban food initiatives in addressing shortcomings of the mainstream food system and advocating an "alternative" food system is connection, or maybe even better: re-connection: reconnecting farmers with consumers, reconnecting food with human and ecological health, reconnecting the country with the city. This emphasis on reconnection is regarded as a means to such diverse ends as: increasing transparency of the origin of foodstuffs, shortening food supply chains, protecting local food traditions, supporting regional producers, restoring confidence in the food one eats, replacing anonymity with authenticity.

Put differently, their ultimate goal is to provide "good food" in terms of creating foodscapes which are socially just, environmentally sound, culturally appropriate, and economically viable. How successful are urban food initiatives in reforming the food system? Preliminary evaluations seem to give no reason to be hugely optimistic about the social effects of Dutch urban gardening projects (Lelieveldt, 2016: 146), and the sustainable effects of the three Rotterdam practice cases are also evaluated as modest (Schyns, 2016: 95).
At the moment, urban food initiatives offer primarily partial and symbolic solutions to big issues. Their transformative power should not be exaggerated – for instance, by identifying urban food enthusiasts as game changers. Moreover, a fundamental question in this respect is what nevertheless can be the disruptive impact of food producers and consumers situated at the fringes of or even outside the conventional food system on making the food-provisioning system more sustainable ("from niche to regime") (De Bakker & Dagevos, 2016). Having said this, it is encouraging, though, that Schyns (2016: 82) finds that various

urban food projects are developing closer mutual contacts. Such interactions are a helpful condition to enlarge their transformative potential.

Another direction to increase their impact is to connect with public officials. However sympathetic and energetic the DIY-urban food movement may be, on its own it is not expected to realize radical breakthroughs in the food system. It would be an unrealistic view of today's conventional food system as well as an overestimation of their gameeurship changing power if urban farmers and urban foodies believe that we are close to the realization of a new sustainable world of food. Finding allies in reforming the food system is a formidable and urgent challenge. Now it has become more acceptable and fashionable in recent times for municipal policymakers to recognize food as a policy issue, to put food topics on their agenda, and to develop urban food strategies, this might create opportunities to join hands. For a synthesis of avant-garde citizenship, reformist entrepreneurship and local-level policymaking, it is needed that urban food initiators try to gain policymakers' goodwill and abstain from the view that they are better off on their own. Municipal policy programmes, in their turn, should take urban food initiatives seriously and support them actively, e.g. by public food procurement, or by granting licences with leniency (Cohen, 2014; Wiskerke & Viljoen, 2012). With respect to Rotterdam, it is suggested that hitherto the municipality's role is restricted to a facilitating role towards already established projects, and is neither organizing new ones nor consistently funding urban food initiatives (Cretalla & Buenger, 2016).
Another drawback of closer collaborations between city governments and nongovernmental actors is that this could have repercussions for the goals set with respect to reforming the food system. The critical and radical voice of social innovative urban food strategies is easily sacrificed to become or remain a respected partner in an urban food coalition and, as a result, gain or maintain local political influence in the creation or consolidation of an urban food strategy.

The sobering thoughts presented so far in this concluding section, have by no means the intention to undermine the significance of urban food initiatives. Their merits, however, should not be sought in the power of numbers per se. One of the merits of small-scale urban food initiatives is that they give a clear expression of what is happening in the vanguard. As such, they often fall outside the scope of many policymakers as well as scholars. It is enriching that they have received much more attention in the last decade. Enriching too, because front-running urban food initiatives often show a much less acknowledged side of consumers, i.e., portrayed as engaged and environmentalconscious rather than only interested in product price and quantity. Consequently, a much more diverse picture of present-day food consumers is obtained that is much more realistic than the image of the purely rational and narrowly self-interested consumer (Dagevos, 2005; Schyns & Dagevos, 2016).
By the same token, today's urban food projects also accentuate the pluriformity of the food system at large. Despite the prevailing productionist paradigm, urban food initiatives remind us of the fact that there is more to the food system than cheap food, global supply chains, hyper-efficient logistics or factory farming. They remind us that the food agenda should not be reduced to the nutritional or purely economic agenda.

Alternative urban food initiatives not only provide positive energy but also growing concerns and negative assessments about the conventional food production and consumption principles and practices. In other words, they bring antagonism into the food discourse. It is hard to overrate the importance of this contribution. Antagonism is a crucial vehicle to discuss the dominancy of certain value sets, mindsets and actual modes of behaviour in order to assess them and find alternative ways of thinking and acting. Respecting and recognizing pluriformity is the lifeblood of antagonism, which helps to find pathways and to propagate opinions and practices beyond business as usual and towards more sustainable urban foodscapes.

In closing, the above-mentioned food initiatives and the variety of urban food projects worldwide may be regarded as concrete examples and human expressions of living for something bigger than ourselves. From this perspective, urban food initiatives cannot be reasonably qualified as small issues but rather as big solutions.

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3 From waste to resource: business model innovation for food in the agricultural sector

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Introduction

With a continuously growing population, the pressure on the food production industry in feeding the world population is increasing and the depletion of natural resources is becoming a tremendous problem. Furthermore, on a global scale roughly one-third of the edible parts of food produced for human consumption, gets lost or wasted (Gustavsson et al., 2011). Waste occurs in all stages of the food production value chain from growers to processors, to supermarkets and consumers (Gustavsson et al., 2011). One solution to secure food production, prevent depletion of food resources and decrease food waste may be found in the concept of the Circular Economy (CE). By means of closed-loop food production chains, efficiency of resource use increases and a better balance between economy, environment and society may be found (Ghisellini et al., 2015).

The ultimate goal of promoting CE via cyclical instead of linear production chains is to decouple depletion of food resources from economic growth. Lessons learned from successful experiences is that the transition towards CE comes from the involvement of all actors of the society and their capacity to link and create suitable collaboration and exchange patterns (Dittrich et al., 2015; Ghisellini et al., 2015). Success stories also point out the need for an economic return on investment, in order to provide suitable motivation to companies and investors. In other words, to overcome the food waste problem, new research on the valorisation of food waste in the agricultural sector is called for (Arancon et al., 2013).

The purpose of this paper is to explore business model innovations and novel value chain constellation for agricultural waste and generate recommendations for the transition of the agricultural value network. Currently application of CE is mainly focusing on recycle rather than reuse (Haas et al., 2015; Ghisellini et al., 2015). Following Zott and Amit (2010), we develop several new business models for reuse of food resources as templates of how firms could conduct business, how it could deliver additional value to customers, and how it could link factor and product market. Closed-loop production chains form the core of these new business models.

Theoretical background

Scholars have identified business models as key to a company's performance (Chesbrough, 2010; Zott et al., 2011). A business model describes how an organization creates, delivers and captures value (Osterwalder, 2010). Business model innovation is characterized by collective and shared value creation. This means that revenues of a (collective) enterprise is not only expressed in terms of monetary values, but also in other values such as time, attention, experience, energy and products (Dittrich et al., 2015; Jonker, 2014). Business model innovation is widely accepted as a means for companies to become more sustainable (Boons & Lüdeke-Freund, 2013; Lüdeke-Freund, 2010; Schaltegger, et al., 2015). Business models can facilitate sustainable innovations (Boons & Lüdeke-Freund, 2013), but more importantly, they can also be sustainable innovations themselves (Lüdeke-Freund, 2010). Schaltegger et al. (2015, p. 4) conceived of another description of a sustainable business model: A business model for sustainability helps describing, analysing, managing, and communicating (i) a company's sustainable value proposition to its customers, and all other

stakeholders, (ii) how it creates and delivers this value, (iii) and how it captures economic value while maintaining or regenerating natural, social, and economic capital beyond its organizational boundaries. Here, a business model should emphasise the generation of value not only for customers, but on society and the ecological environment as well. In order to become sustainable, the whole organization, rather than only some parts, will have to go through a transition (Loorbach & Wijsman, 2013). Thus, seeing as business model functions as the architectural backbone of an entire organization (Teece, 2010), turning to business model innovation is a valid way to address such a sustainable transition. Yet, there remains a gap in the literature with regards to the relations between components in a business model, as well as the need for theory on embedding sustainability into a business model (Bocken et al., 2014; Morris et al., 2005).

Circular business models aim to shift 'scarcity to abundance' in which they create solutions for environmental issues by integrating novel scientific insights and technologies into new economic systems (Kathijotes, 2013). Moreover, they are based on two principles (Pauli, 2010). The first one is that all matter and energy can be reused (or 'cascaded') in new species. This means, nutrients are becoming locally available resources and is waste used as resource for something else. For example (Pauli, 2010): Biomass becomes a source to stimulate the growth of mushrooms. Mushrooms are protein-rich feed for animals, and animal's manure are inoculated with bacteria in order to generate biogas. The slurry that is created because of the production of biogas is used as nutrient source for algae farming. Algae are useful for water purification and the residual water promotes growth of planktons that becomes fish food. The second principle is based on the law of physics. Ecosystems rely on physical processes that can be used in order to create scientific solutions that are both economic and societal beneficiary. The biggest objective of the Circular Economy is to create environmental solutions, while offering products and processes that are affordable for everyone in the world (Pauli, 2010). However, this system highly depends on disruptive, new generation entrepreneurs that have found their ways in science, nature-based technologies to be able to develop such sustainable business model innovations.

Research approach

We will employ a holistic multiple-case design. Analysing multiple case studies makes it possible to include many different entities (e.g. different roles in the value chain), and are more valid and generalizable than single-case studies because findings are based on a larger variety of empirical evidence (Yin 2003; Eisenhardt and Graebner 2007). The population of interest in this study is defined as companies in the food, production, processing and retail industry, whose business models were affected or are currently being affected by the integration of food waste valorization. We have selected two cases in food production and processing, based on a theoretical sampling logic (Yin, 2003) to investigate different contextual, organizational and market conditions.

We draw upon cases from several actors in the food production value chain, including growers, food processors and retailers. The first case, the Bio-Hub Dronten, is a consortium of growers and food processors, aiming to set-up a local processing industry for lower qualities of food resources and residual waste from the food producing process. The

residuals streams currently consist of whole carrots, potato waste, and onion and garlic peels. The second case is a consortium in the fish processing industry, which aim at regaining proteins from fish waste.

Transition towards circular business models

Our research focuses on the cyclical use of natural resources, leading to new entrepreneurial acitivities of agricultural firms, contributing to a circular economy, sustainable and circular production systems and closed-loop logistics. The goal is to enhance the eco-effectiveness of natural resources and biomass use via local, small-scale bio-refinery and cross-sectoral production and processing.

The onset of this closed-loop agricultural industry requires new business models and social innovation. The transition from linear to circular not only calls for technological advancements, but also some profound social changes. One of the challenges in this transition is that residual streams in the agricultural industry, such as manure, are currently liabilities for individual firms (also due to transportation costs, time and energy spent). Our objective in this research is a transition towards new, circular business models for developing high quality, high-end products from residual streams. In the development of new business models, we concentrate on the three layers top of the value pyramid (see Figure 1), i.e. on Health, Nutrition and Chemical & Materials, rather than Energy (& Soil).

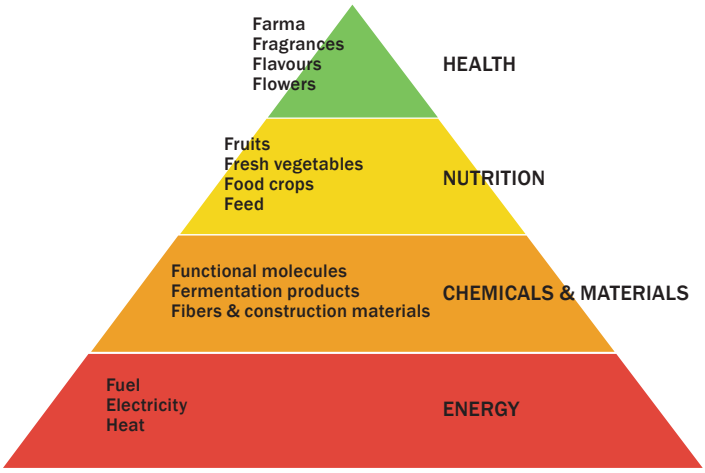
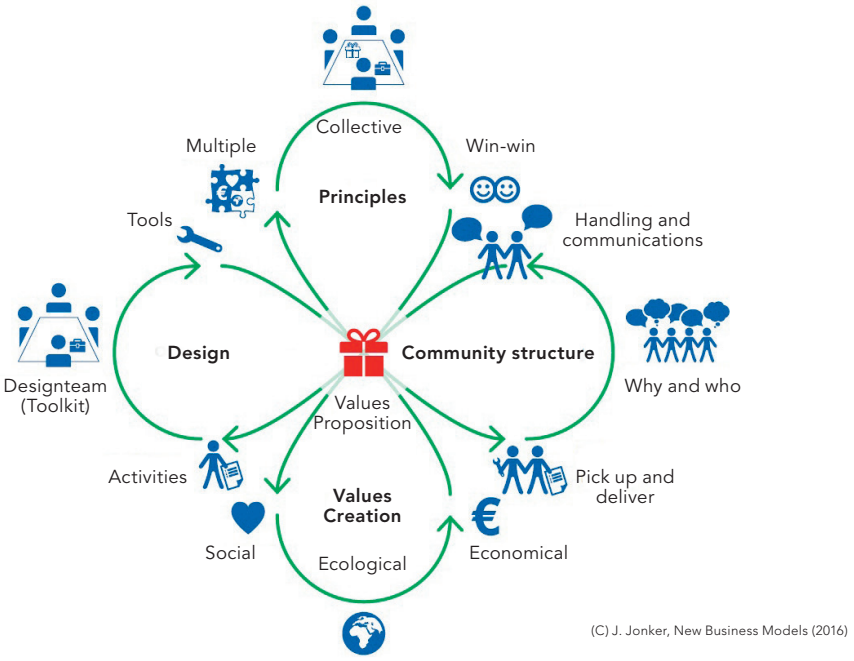


Figure 1: Value pyramid for residual streams in agriculture

Source: Adapted from http://maken.wikiwijs.nl/51426/Introduction_to_the_Biobased_Economy#!page-839684

Business model innovatoin based on shared value creation, delivering and capturing is the starting point from which we investigate how the current value network will have to change to enable new business models and the underlying new production processes (Jonker, 2014; see figure 2). Innovative capacity needs to be embedded and optimized in the whole food

production and processing chain need to enable eco-effective production processes which are economically, ecologically and socially viable. Non-technological aspects, such as regional embeddedness, logistics and social acceptance, need to be included to faciliate the tranistion towards cyclical used of resources. Opportunities for new business models and production activities that serve societal needs are the starting point. This means that e.g. packaging and transportation are also based on circular principals.



Concluding remarks

Several options for business model innovation in food waste that meet the requirements for industrial operability are in existence, including compost, animal feed and bio-chemical elements such as anti-oxidants and vitamins. High-value chemicals such as bioplastics can also be generated from food waste, but are economically less viable. Complex processes are not necessarily required to derive value from food waste. Produces, processors and retailers can individually have a great impact in reduction of food waste. However, we recommend taking a holistic value chain perspective to speed a transition towards complete new business models which may eventually lead to a zero-waste food production and consumption value chain. Our first findings show multiple routes towards sustainable business models for food waste, requiring different scales of transition of the actors along the food production value chain, ranging from differentiation and customer segmentation, to exploring completely new markets.

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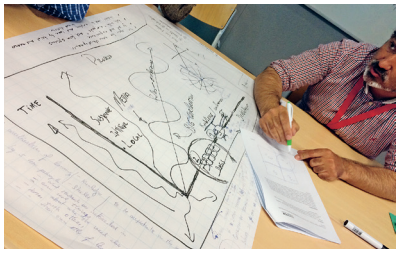


europea
nederland
Feeding
the Cities
of the World.

4 Emergent problems, knowledge building and responsive education[1]

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1 This contribution is, besides some small differences, previous publicated as parts of Understanding the difference (De Jong, 2015).

Reducing the ecological food footprint, feeding nine billion people by 2050, boosting social and community involvement in the agri-food sector and working on the 'new' economy with new business models based on the principle of shared values are urgent topics: these issues concern fundamental change which is not achieved by optimising or repairing traditional, non-sustainable systems. After all, if you do what you did, you get what you had. But what is needed in order to bring about fundamental system changes that contribute to the development of an innovative, reflective bio-based society, a circular economy in which shared values, technological developments, new scientific insights about learning and social innovation together will be a powerful catalyst (de Beus, 2015).
As education has an important role in learning to think, education itself should think about a transition too, and work on its responsiveness. The development of this 'responsive education' is part of the Aeres University of applied Sciences Wageningen research program (de Beus, 2015).
The DAC Guidelines on Poverty Reduction, published in 2001, have already shown that poverty has multiple and interlinked causes and dimensions: economic, human, political, socio-cultural, protective/security (OECD, 2006). Reports such as 'Promoting pro-poor growth: agriculture' (OECD, 2006) and many others seem to make no difference for eduction. This is a denial that the agricultural and environmental crisis is much more global and culture-related and therefore also education- related.
A lot is known in and about our world and information is easy accessible on the Internet, but perhaps we are not educated to see and think in relationships. At this point a better look is needed at the dominant role of education in how we learn to think. In many schoolbooks thinking in causality and directionality of effects is implicit, and even sometimes explicitly formulated. The logical analytical paradigm is dominant reflected in the teaching behaviour and conceptual thinking of students (Rossum & Hamer, 2010). This kind of thinking is also reflected in the globalisation process of where only a few corporations control the market, resulting in low sovereignty for farmers and consumers. This is not much different from the lack of sovereignty students have in what and how to learn and in short how we think, and therefore the barely facilitated socially relevant learning.

Need for an ecological intelligent way of thinking

How can education as the womb from which we all learn how to think be responsive to this difficult dilemma or double bind (Bateson, 1972/1987) situation? Double bind because on the one hand we have to admit the western positivistic way of scientific thinking brings us a high level of prosperity and well-being, while on the other hand it brings with it a lot of very complex problems in the world. Take for instance the positive intention and first effect of the discovery of fertilizers, and the impoverishment of the soil due to the lack of natural fertilizer today or the dependency of poor farmers in developing countries on fertilizers. Our current way of thinking threatens human existence by the exhausting of natural resources and unbalanced dissemination of supply for the basic needs. Are students being made aware of these double bind phenomena and are they being educated how to deal with them? During my regular visits to scientific educational conferences, I notice in the science teaching a lot of modelling and reconstruction of facts, 'objective' knowledge and data supported by simulations, even in cases where the research is about innovative educational settings such as peer dialogue in computer supported collaborate learning. It appears that

in the teaching of teachers and teaching by teachers and professors the relational way of thinking is being neglected and in this sense the ecological crisis is a crisis in our thinking to which education has to respond in order to contribute to solving the crisis. Teaching students to think in an ecological intelligent way, e.g. thinking in relationships and their nature, is vital to the development of ecological intelligence and thinking (Bowers, 2010). According to Bowers (2015) it is more thinking in the roots of Confucianism, Taoism and Buddhism with a focus on the awareness of the world of relationships and codes that guide these relationships. This is not ecological awareness in the sense of managing nature into which the Greek word *oikos* has been translated many times. It concerns understanding *oikos* in the Greek sense of interaction including the norms of many cultural practices. *Oikos* in the sphere of biosemiotics, how all aspects of the world work as a process of interpreting, meaning making and actions. This is the idea that life is based on semiosis, i.e., on signs and codes (Barbieri, 2008), understanding relationships not as cause-effect relationships, but as a process of messages, information, signs, codes of all kinds such as electrical, chemical, visual, genetic, temperature, radiation, cultural, e.g. menomic, language, conceptions and ideas. It means understanding that thinking is interpreting information, codes and signs, information that inhibits or promotes adaptation, transition, responsiveness or change, codes that give rise to great novelties of macroevolution (Barbieri, 2008; Hoffmeyer, 2008).

This way of ecological intelligent thinking is the epistemic opposite of the paradigm that the autonomous individual (scientist) as a rational being can 'observe' objective information from the external world as is if it is about distinct objects. It is seeing the individual as a Dasein in the world (Heidegger, 1977), constructing meaning as part of and influenced by the relationships, e.g. the process of continuous communication and interpretation of signs and codes impacting on how we think, adapt, change and die out.

Reality cannot be understood without interacting with this reality (Naess, Christophersen, & Kvalø (1956) as cited in De Jong, de Beus, Richardson, & Ruijters, 2013). Entities and moments of insight are not propositions but actions (Tuinen, 2012). 'Connectedness' stands in contrast to a dualistic and deterministic separation between object and the knowing subject. It is thinking the relationship of theory and practice instead of separating it. It is complementary to (De Jong et al., 2013):

- the view that everything is knowable, that everything is caused by something
- reductionism of reality to quantities of what can be known, and
- the view of a calculated reality as the only knowable reality.

Ecological intelligent thinking is more a constructivist view that many educators and teachers refer to as a frame for their pedagogical acting, but actually generally do not realize. It is acknowledging that every situation is unique in relation to a previous one. It is like that every second step in the river never is the same as the first one as Heraclitus taught. Reality is always on the move and dividing it into stand-alone objects, facts, and propositions is artificial, a particular way of thinking. Reality seems to be more a dynamic, constant change of connections. Entities seem to be just temporary connections, expressions of reciprocal dependency (De Jong et al 2013).
Ecosystems are open (living) connections between elements. Reciprocal relationships are

Figure 7: Margritte's painting of a pipe.

the essence of living systems, such as in the humanities. Interventions can have major consequences for a system (Engeström, 1987). It is therefore important to know in which system you are intervening. You have to zoom in and out in order to oversee the whole. Understanding complex reality goes beyond knowing and understanding stand-alone entities, by interpreting the relationships, the connectedness of the different entities, and their reciprocal dependencies. Thinking in relationships enriches the paradigm of giving meaning, naming, and describing entities (Libbrecht, 1995). In terms of Bateson, (1987; Montuori & Mountuori, 2005) creating meaning is the basis of the difference between entities that makes the difference and corresponding actions that lead, for example, to transition. Relationships, especially in the humanities, can have a qualitative value, and intuition and imagination as a way of thinking and learning (Ruiters, 2011) come to play a role in interpreting them. In the drive to understand, questions arise regarding what 'is', what the connection means, and what makes up reality in all its complexity?
Ecological intelligent thinking presumes that humans are active beings in an interactive relation to their environment; acting towards objects and other species on the basis of the meanings they ascribe to those objects and species on the basis of the signal interpretations in the interaction with them. Meaning arises out of social interactions with others and society, as the result of interpretative processes by a person while dealing with their environment including nature. In a sense, this connects to the basic three premise of symbolic interactionism (Blumer, 1994) and three additional premises which clarify and extend Blumer's position by Charmaz and Snow as cited by Charmaz (2014):

1. "Humans act toward things on the basis of the meanings they ascribe to those things."
   - Meanings are interpreted through shared language and communication ((Charmaz, 1980), p25).
2. "The meaning of such things is derived from, or arises out of, the social interaction that one has with others and the society."
   - The mediation of meaning in social interaction is distinguished by a continually emerging processual nature ((Charmaz, 1980), p25).
3. "These meanings are handled in, and modified through, an interpretative process used by the person in dealing with the things he/she encounters."
   - The interpretive process becomes explicit when people's meanings and /or actions become problematic or their situations change (Charmaz, 1980; (Snow, 2002).

It relates even more to what Bateson indicates in his book 'Steps to an ecology of mind' with 'the differences that makes the difference' (Bateson, 1987, p.276). Seeing relationships as the ecologies of differences that lead to reciprocal response, e.g. consolidation and change. How often do we ask ourselves and our students to inquire what the difference is, in the information, to what an animal, a person, an organization, a substance responds and by doing so impacting his or its behaviour or appearance e.g. it's being. These differences, information, are not attributes of a subject or object, but are the relationships. It is the space indicated by Ruijters, (2015) by citing Frankl (1905-1997): 'Between stimulus and response there is a space. In that space is our power to choose our response. In our response lies our growth (..).'
In current science and education, the main focus concerns the descriptions and determinations of attributes of the subject/object of study, correlational or causal explanations and predictions. In ecological intelligent thinking understanding relationships goes beyond such a focus by understanding the reciprocal process to the other (subjects and objects).

Back to education

So coming back to education, according to Bateson we need not only the world of the conceptual artefacts, the public community knowledge, such as theories, ideas, sculpture art, dance, music, traditions and scientific concepts, but also the process. As in scientific research, you start from two beginnings instead of one. Each of which has its own kind of authority: the observations cannot be denied, and the fundamentals must fit. Bateson illustrates the scientific thinking process as follows (Bateson, p6): "If you are surveying a piece of land, or mapping the stars, you have [remark: to start from] two bodies of knowledge, neither of which can be ignored. There are your own empirical measurements on the one hand and there is Euclidean geometry on the other. If these two cannot be made to fit together, then either the data are wrong or you have argued wrongly from them or you have made a major discovery leading to a revision of the whole of geometry". Actually we see here a process of knowledge building, which could be a starting point for responsive education. In the knowledge building process (De Jong, 2006) you start from your own idea (theory). You then look whether it fits with what can be observed in practice and what is known in scientific or practical theories. You need to enter into dialogue with others in order to reach a better collective understanding of the phenomenon by listening and exploring someone else's idea. Empathically willing to understand them and contributing to them and rising above when finding the difference that has potential for the future, our world and handling in the own ecology. Building up the rise above leading to a shareable conceptual artefact on which others can build on again in their turn. That is why knowledge building as alternative for current 'school learning' relates to transitional thinking and how education can be responsive to it and what kind of 'learning' is needed to develop ecological thinking of students. The following is relevant in this context.

A theory or study book is not reality.

It is good to realize that all the pictures and text above are not the 'earthy' reality as is René Margritte's painting is not a pipe (fig. 7) but a painting of a pipe and the above figure 7 is a print of the painting of the pipe by Margritte. They are the flickering shadows projected on the wall of the external reality which they are only able to see by the people living in Platos

cave. It is therefore important that scientists and students recognize that the words and language used has a history and a cultural background. So by using theories, students use the thinking and the way of looking at the world of previous era as is stored in the language. Approaching data or phenomena from different perspectives is limited because we educate students in a particular language of a discipline or domain by modelling them in the thinking of that discipline or domain. Jargon and abbreviations in that sense are not only a reflection of implicit, informal knowledge, but also a way of thinking and communicating in a particular community. Although students feel they get more grip on reality, they actually are more estranged from earthy reality. I think this is what Bateson calls 'the map is not the territory'. Theories, study books, art, e.g. conceptual artefacts, are a man-made reality linked to the earthy reality in the same way that the nautilus shell is linked to the lunar cycle. A theory is not the earthy reality. This you can experience when, for instance, students return from internship saying 'in practice everything is different'. Students seek the difference of thinking of the theory in relation with practice.
Reading textbooks, theories, standard curricula and whatever students learn at school, they discover that is not the real reality. They learn conceptual artefacts enclosing old ways of thinking e.g. looking at the relationships in the world for instance as cause-effect explanations and predictions. It is the constructivism tenet that draws our attention to the perspective that "reality construction is the product of meaning making shaped by traditions and by the culture's toolkit of ways of thought" (Bruner, 1996)
As such nothing is wrong with this. But it sets transition and education in a double bind situation. This double bind situation where we teach well-intentioned ideas and agendas which brings prosperity, but also ideas that actually contribute the problems rather than actually overcoming the current social and ecological problems. We cannot fix problems by relying upon the same mind-set that created it (Einstein quoted by Bowers, 2015). Gadamer (1975) already taught us that the understanding of events is always influenced by the previous experiences that are already available. There is no understanding which is free of our previous experience and no method can free readers and writers of these previous experiences. This is particularly true in terms of method and evaluation noted preconception affects what is heard and read. The method is the view by which you want to see the world. The 'truth' is the experience. We have to be aware that there is not one 'truth', we must be aware that "after us, others always will understand different". (Gadamer, 1975, p 355)[1], History is not a fixed truth, but a process of ideas and changing of ideas. It is the process where the truth goes beyond the subject's knowledge, you can feel the truth but you can't denote, tell or describe it. This makes the truth, that understanding is language. Language is relative[2] and so are theories in relation to the world of practice. Being aware, and being taught this awareness, is essential to progress in our understanding, in seeing which difference makes the difference, which makes transition.

'Understanding the difference' might be a way to follow

Nowadays students of all ages have experiences on the internet going beyond the boundaries of their own personal perspectives, time and space. They are used to viewing a

1 *"Es liegt in der geschichtlichen Endlichkeit unseres Daseins, daß wir uns dessen bewußt sind, daß nach uns andere immer anders verstehen werden"* (Gadamer, 1975, p 355).

2 Sapir-Whorf hypothesis (the hypothesis of linguistic relativity) states that the specific language we speak affects the way we think about reality.

particular phenomenon from different perspectives in the avalanche of information search machines give you when you enter a keyword. When they come to school, they are generally restricted to one information method, mainly a mechanistic view of looking at life which is actually much more an organic process; and standard tests. What they often miss is an education in which they learn from the differences of all this variation of perspectives and information. To build knowledge from it. Not by learning by heart and being drilled in the reproduction of different models, theories, etc. and taking them for granted, but learning to understand these models and theories by entering into dialogue and discovering what makes the difference between them and the fit with their reality. Discovering how old 'language meanings', e.g. way of looking at the world in previous times, are implicit to it and where the potential is for the future. Education means looking to the relationships in the sense of what makes difference makes students unique as a individual semiotic creatures. Unique in the way he as a person creates meaning by researching that the theory is not the practice and learning from the different perspectives, from the variations of the double bind situations, and building new ideas to overcome complex problems of current life. This all gives thoughts and a basis for looking at learning and the educational process from a different perspective. Knowledge building is such a different perspective.

Knowledge creation/building

Knowledge building (Bereiter, 2002; Bereiter & Scardamalia, 2006a)(Bereiter, 2002; Bereiter & Scardamalia, 2006a) or knowledge creation (Nonaka, 2006; Nonaka & Toyama, 2003; Nonaka, 1994) concerns the same processes, although knowledge building is more education related and encompass a greater range of concerns (Scardamalia & Bereiter, 2014). Both certainly consist of the social and group dynamic processes as is the case in collaborative learning. However, the latter does not always include the systematic, methodological, empathic and hermeneutic process of knowledge creation. In knowledge building the social interactions are also an enculturation in the world of science and cultural artefacts Popper's world 3. Tools in knowledge building environments such as Knowledge Forum®, support the development of ideas, theories, conceptual thinking and artefacts and enculturation in World 3. It refers to a set of social practices that advance the state of knowledge within a community over time (Paavola et al. 2004). The knowledge building principles are guidelines for idea improvement; they are not scripts, not linear steps to follow. The knowledge building principles "serve multiple purposes like pedagogical guides, technology design specifications, evaluating 'existing' practices" (Scardamalia & Bereiter, 2010, p. 9), and guiding teacher's to organize the knowledge building.

According to Van Aalst, (2009, p. 260) knowledge creation involves more than the creation of a new idea; it requires discourse (talk, writing, and other actions) to determine the limits of knowledge in the community, set goals, investigate problems, promote the impact of new ideas, and evaluate whether the state of knowledge in the community is advancing. Van Aalst distinguishes three modes of discourse—knowledge sharing, knowledge construction, and knowledge creation. Knowledge sharing refers to the transmission of information between people. According to Van Aalst knowledge construction refers to the processes by which students solve problems and construct understanding of concepts, phenomena, and situations by making ideas meaningful in relating to prior knowledge and

the problem situation mediated by social interactions within a group and technologies. Knowledge construction, with its emphasis on building on students' prior ideas, concepts and explanations, and their metacognition, produces deeper knowledge in complex domains than does knowledge sharing (Bransford et al. 1999; Hmelo-Silver et al. 2007). Van Aalst connects knowledge creation to expertise of the situations, and the requirement of environments (companies, organizations, academic disciplines) where ideas are needed to sustain innovative in order to survive as an organization, being an organic system in a big relational world.

The big difference with other cooperative and collaborative learning is that knowledge building takes you directly into the process of idea improvement as the basis of education. It is 'acquiring competence in knowledge creation by actually doing it" (Scardamalia & Bereiter, 2014, p. 399). It is enculturating students in their role as collaborative knowledge creator in the sense of improving ideas. Knowledge building is much more an idea improvement centred process by means of collaboration in advancement of a community. According to Scardamalia and Bereiter (2014; Bereiter, 2002) knowledge building derives from a Popperian epistemology e.g. Poppers "three world" ontology. Here world 3 consists of an objective knowledge world created by the human mind. It is knowledge in the form of conceptual artefacts which can be acted on as an object. So you can work with knowledge because you can grasp it, build on it, modify it and develop it further. This is different from co-constructing knowledge as in Collaborative learning.

In relation to education Scardamalia and Bereiter (2014) put forward 5 of the 12 principles as vital themes. 1) *Community knowledge advancement.* Knowledge is not a proposition of a person, but of a culture and community and it contributes to the wisdom of the community and its members. 2) *Idea improvement*. There is not such a thing as a final truth, perfect theory, technology or living together. It can always be improved. All ideas can be improved and in this sense all ideas are valuable. 3) *knowledge building discourse* as a creative role instead of a critical role and a collaborative process. 4) *constructive use of authoritative information*. This means all kinds of information, first-hand experience, secondary sources, etc, that has value in the knowledge building process in a constructive transliteracy practicing. 5) *Understanding as collaborative explanation building*: producing principled practical knowledge by connecting concrete experiences to more generalizable knowledge. Knowledge building is innovation, based on 'principle practical knowledge' and theoretical concepts in a coherent explanation for practical use (know-how combined with know-why).

Looking at a theory is like looking at any other conceptual artefact. One has to become engaged and has to explore the thinking of theory. *It is these kinds of knowledge building conversations with the others in the artefact, and with others about the artefact in which relations, e.g. differences come into language in the conversation.* Not as an individual property of the interlocutors. 'What is', is 'laid down in the middle' as a 'rising above' in collective, in community, as a common language of collective understanding (a hermeneutic 'collective Verstehen'). A rise above as a common language of understanding in which the 'old thinking' is revealed in its inclusive principles and higher problem formulations into new syntheses. Partners, knowledge builders, in the conversation, "transcend trivialities, oversimplifications and move beyond current (best) practice" (Scardamalia & Bereiter, 2010, p. 10; Scardamalia, 2002, p. 79). Gil-Perez (as cited by Van Aalst, 2009 p. 262) interprets the Rise above as a cognitive act. It is the process of arriving at a common language of collective

understanding. It is a process of grounding, synthesis, leading to a new conceptual artefact to go public with and by doing this enriching the community. The principle is the 'knowledge building conversation' which distinguishes itself from interpersonal dialectical dialogue, debate, discussion, etc.
The knowledge building conversation is not an adjusting to each other as partners in the conversation. Partners become engaged in the artefact, coming under the truth of the matter or praxis, under the resonation of understanding reality. A resonance of organic connectedness and dependency of our being as part of others and nature. Resonations that partners in the knowledge building conversation combine in a *new* common ground. In the 'knowledge-building-conversation' it is not merely against each other and putting your own positions forward, but a transformation into the common, into the collective.
A transformation in which one does not remain who one was. (Gadamer, 1975, p. 360)[3].

Educational case

Our two year (part-time) program (MEd) Master Learning and Innovating (MLI), for teachers working in pre- secondary and higher vocational education and people who are involved in learning for the profession in business, is based on knowledge building (Bereiter, 2002; De Jong, 2006). Teachers and students guide themselves with the metaphor of progressive inquiry learning (see fig. 25) (Hakkarainen, 2003a, 2003b; Muukkonen, Hakkarainen, & Lakkala, 1999) and the knowledge building principles (Scardamalia & Bereiter, 2010; Scardamalia, 2002). The teacher experiences led to some important guideline that works when organizing knowledge building with the students.

- *From the collective to the individual:* 'learning together' is easier if students form groups on the basis of their own ideas and find an underlying and practical related common issue, or question to work on together. They then study the literature and acquire practical knowledge not in order to validate their own conceptions, but to contribute to the common issue which is collectively under study.
- *Heterogeneous groups:* If students from different ecologies, in our case from education and business, are in a group, the implicit culture of thinking is easier coming into language.
- *Two beginnings:* Students build up common knowledge by taking literature and empirical observations in their work context as the starting point. This stimulates thinking about the signs in the literature and the signs coming from their practical experience and facilitates interpretation of the differences in terms of the potential a theory has in practice.
- *Conceptual artefact:* By interpreting the signs from theory and practice, students collectively build a model, for instance a model of learning, e.g. students 'rise above' to a higher conceptual level.
- *Going public:* The collectively conceptual artefact, is presented to the public, e.g. peers, colleagues at work and they expand the intersubjective space.

3 "Die Verständigung über die Sache, die im Gespräch zustande kommen soll, bedeutet daher notwendigerweise, daß im Gespräch eine gemeinsame Sprache erst erarbeitet wird. Das ist nicht ein äußerer Vorgang der Adjustierung von Werkzeugen, ja es ist nicht einmal richtig zu sagen, Daß sich die Partner aneinander anpassen. Vielmehr geraten sie beide im gelingenden Gespräch unter die Wahrheit der Sache, die sich zu einer neuen Gemeinsamkeit verbindet. Verständigung im Gespräch ist nicht ein bloßes Schausspielen und Durchsetzen des eigenen Standpunkten, sondern eine Verwandlung ins Gemeinsame hin, in der man nicht bleibt, was man war. "

- *Back to the personal idea:* At the end of the course students take the collective artefact and reflect on the impact of this artefact on their initial and personal idea, which generally has already changed during the collective process.
- *Teachers also build knowledge:* being a model by building knowledge yourself as a teacher in which knowledge building conversation students are free to participate or just watch, might help to get thinking into language and stimulate the transformation process of seeing the world differently.

Responsive education

Responsive education concerns the intimate nature of learning and the teaching of a different, transitional, kind of thinking and ecological awareness, thinking, interpreting differences in signs and acting. Responsive education deals with four crucial ideas in learning and teaching:

1. *Agency:* more control for students of their mental activity (Bruner, 1996; De Jong, 1992) and improving students' own ideas (epistemic agency; (Bereiter & Scardamalia, 2006a; De Jong, 2006; Scardamlia & Bereiter, 2014):
   Students have ownership of their learning and ideas

2. *Culture:* 'coming into language' of how the way we live and think and construct thought are embedded in the knowledge we claim as 'reality' and how our mind set perceives and interprets signs in the ecology we are part of (Bateson, 1987; 'reflection; knowledge is justified belief', Bruner, 1996; 'rethinking assumptions', Sterling, 2009):
   Students question presumptions and 'realities' of what they learn.

3. *Learning together:* creating meaningful connections between individual and society by 'coming into presence' into an intersubjective space (Stroobants, & Wildemeersch, 2001; Wildemeersch & Stroobants, 2009). The sharing and negotiation of meanings to construct shared conceptions (Charmaz, 2014; Dillenbourg, 1999; Stahl, Koschmann, & Suthers, 2014); explanatory coherent practical knowledge, combining 'know-how and know-why' aiming at solving problems, guiding practice. Understanding through collaborative explanation (Bereiter, 2014; Scardamalia & Bereiter, 2014).
   Students build new meaning together for solutions.

4. *Knowledge building:* not simple 'learning in the raw" (Bruner, 1996), 'rote learning', reproducing or solving a well-known problem, but a semiotic process of entering into a collective understanding, grounded in the consequences of the system of relations that makes a difference for life. ('community knowledge advancement'; conceptual understanding, enculturation in the world of creating knowledge; Scardamalia & Bereiter, 2014; Bereiter, 2002; De Jong, 2006; cultural artfacts, Stahl, 2006).
   Students learn together and go beyond what is known and done.

Water is on the lips if we look to the serious problems human kind has to deal with. Education, and the way teachers deal with developing the thinking of their students is crucial. The rather common way of teacher and content centred learning will not contribute enough to solve the crisis in our thinking. Idea (improvement) centred knowledge building

has much more potential that students think in a relational way to see which theory makes a difference in the dilemma's we are confronted with.

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5 Transitioning toward healthier dietary patterns

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Diet and life-style related diseases

Lifestyle-related diseases like diabetes type 2, cardiovascular disease and psychiatric disorders are among the primary causes of disease burden world-wide, especially in high-income countries (Mathers, Loncar 2006). Research consistently shows that a high vegetable, fruit and fish consumption protects against lifestyle-related diseases, whereas high consumption of refined carbohydrates and trans-fats are risk factors.

Prevalence and incidence of lifestyle-related diseases have risen remarkably over the past decades. In The Netherlands health care is going to be unaffordable within 15 years if these high prevalences remain unchanged. In these same decades, governments, including the Dutch government, continuously kept advising high carbohydrate, low fat dietary patterns, providing up to 70% of daily energy intake from carbohydrates. These consensus diets contain generous amounts of whole grains and replace saturated fats with unsaturated fats, without specifying the source of unsaturated fats.

Dietary interventions focusing on fresh vegetables, fruit, meat, fish, eggs and nuts with the exclusion of processed food, grains, dairy and high omega-6 unsaturated fats, a so-called Paleolithic diet, have also shown promising results (Manheimer et al. 2015), even when equal amounts of energy were derived from carbohydrate, fat and protein (Masharani et al. 2015). Another body of recent research suggests that dietary patterns which are much lower in carbohydrates and much higher in fats, so-called low-carbohydrate diets, are capable of reducing risk factors, such as weight and insulin in healthy individuals as well as in overweight individuals (Steckhan et al. 2016, Mansoor et al. 2016).

Putative mechanisms

Several putative mechanisms might explain beneficial effects of Paleolithic-type and low-carbohydrate diets over consensus diets. One large factor might be the exclusion of grains. Consumption of refined grains has been related to many life-style related diseases including Diabetes type 2 and depression (Aune et al. 2013, Rahe, Unrath & Berger 2014) and is excluded in most consensus diets. Additionally, consumption of whole grains might be detrimental too, especially if one replaces vegetables with whole grains. Vegetables not only contain much higher concentrations of vitamins and minerals per kilocalorie compared to whole grains (Drewnowski, Fulgoni,Victor L.,,III 2014), they also contain much less anti-nutrients, substances that inhibit absorption of other nutrients and/or damage the gut-lining. The gut-lining plays an important role in protecting the body from infectious agents, such as bacteria and viruses (Bischoff et al. 2014). Gluten is an example of an anti-nutrient that has long been known to damage the gut-lining in susceptible individuals. More recent research has shown that gluten compromise the barrier function of the gut-wall without damaging it in presumably all individuals (Drago et al. 2006). Additionally, grains have shown to decrease satiety and increase hunger (Bligh et al. 2015), which could possibly contribute to over-eating. Other factors might be reduced sodium and increased potassium intakes, increased omega-3 and decreased omega-6 intakes and altered compositions of gut-bacteria.

Central question

The central question I want to answer in my professoriate is whether transitioning towards dietary patterns can contribute to reducing health-care related costs. This central question is subdivided into three specific questions. First, I want to answer the question whether

advising the general population to consume a Paleolithic-type diet including fresh vegetables, fruit, meat, fish, eggs and nuts but excluding processed food, grains, dairy and high omega-6 seed-oil, reduces physical and psychological symptoms. If this turns out to be the case, this dietary advise has a high preventive potential. Second, I want to answer the question if offering healthier choices to employees or students can help to increase performance, health and well-being. This is important and urgent, because many companies face disease-related loss of labor potential due to life-style related diseases and because life-style related diseases have their onset at increasingly young ages. The third research focus of the IMPACT professoriate healthy and sustainable food and Western disease is studying the effects of transitioning toward unprocessed food in health-care settings.

Citizen science

Recently, a pilot-study of the first research focus has been completed. Thirty-six individuals from the general population were advised to eat according to the Dutch consensus diet during four weeks and according to the Paleo diet during another four weeks. Results from the pilot study showed a slight reduction in physical as well as psychological symptoms for the Dutch consensus diet and a large reduction for the Paleo diet (Figure 1). Power-analyses suggest that a sample of 70 participants would give 80% power to show significant differences in both physical and psychological symptoms in the normal population between the two dietary patterns.

Figure 1. Results from pilot study comparing effects of the Paleo diet versus the Dutch consensus diet on physical and psychological symptoms in the normal population.

Apart from showing significant differences between the two dietary patterns in the general population, it is also interesting to investigate individual differences in effectiveness. Additionally, it is interesting to gain insight into the mechanisms through which this dietary advise reduces the number of symptoms in the general population. To attain these goals, I aim to recruit as many individuals from the general population as possible to participate in this dietary experiment, and build a data-base containing information about effects on physical and psychological symptoms as well as physiological and biological markers of health and disease. Using this approach many individuals are encouraged to consciously experience the effects of these two dietary patterns, while all these individuals had the chance to contribute to scientific research.

Healthy canteens

The aim of this project is to investigate if offering healthier choices to employees or students can help to increase performance, health and well-being. Healthier canteens are stimulated through many different initiatives. During my professorship, I aim to investigate the effects of one or more of these initiatives.

Unprocessed food in health-care settings

Currently, students of Van Hall Larenstein, University of Applied Science in Leeuwarden are collecting data about changes in health and well-being during the first four weeks of admission to two centers for orthopedic revalidation. One of the centers transitioned from traditional food-preparation for their clients to fresh cooking following the principles of

Dutch Cuisine (Kooy, De Boer 2012). Dutch Cuisine is based on five pillars: culture, health, nature, quality and profit. Culture stands for cooking with fresh, regional products according to local traditions. Health stands for healthy food for body and mind and for our planet. Dutch cuisine encourages the use of 80% plant foods and 20% animal foods. Nature stands for eating whole foods without artificial ingredients. Quality stands for respect for the products that are used for cooking, and encourages the choice for organic, fair-trade, fresh and regional products. Profit stands for a diet that is profitable for the consumer's health, the farmer, and the planet. In practice, all foods are bought from preferably organic, local companies, are freshly cooked with minimal ingredients. For example, bread is bought from a bakery that uses whole wheat meal, water and salt for baking bread based on a sour-dough culture. Freshly cut, organic, seasonal vegetables are used for preparing cooked meals. Home-made stocks are used as the basis for soups, and whole chickens are used instead of just the breast. While this new way of cooking is inevitably more expensive, this revalidation center claims to earn the extra investment back with lower health-care costs. They subjectively report happier clients, resulting in happier personnel, more favorable weight changes and better metabolic health resulting in fewer prescriptions. In the reference center, pre-prepared foods are used. This center is used as the reference center, as this is common-practice in many Dutch health-care settings. The aim of this project is to investigate if cooking with fresh ingredients instead of pre-prepared foods has positive effects on health and well-being of in-patients.

Challenges for education

If such transitions turn out effective, this would have major implications for the training programs of our students. Students in all domains of food production and health-care related studies would need to learn different skills compared with current programs. One of the ways we could foster innovative thinking in students, is by giving them the chance to experience the barriers and benefits of a diet transition. I would like to develop a method during which students experiment with their diet, including Paleolithic-type and low-carbohydrate diets. This experiment gives them relevant information that can be used for educational purposes. For example, students could use an electronic diary to collect information about their academic performance, health and well-being. Collected data can be used by each individual student during statistics courses. Additionally, individual data can be aggregated to investigate the effects of different dietary strategies, information from which could be used during health and food modules. On the other hand, their experience could also be used to identify barriers of healthy dietary patterns that can be used to create novel solutions for educational modules about product development or communication strategies. In other words, the much needed dietary transition needed for reducing the burden of life-style related diseases could go hand in hand with a transition in education.

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About Europea

Europea (www.europea.org) is an association working for the development of vocational education and training (VET) in the green sector of Europe. This sector covers a wide field of professions within agriculture, horticulture, forestry etc.
At present, Europea organizes 24 nationalEuropea networks, which represent more than 1.000 vocational schools and institutions for higher education all over Europe. Europea offers a network of European colleagues committed to international cooperation and sharing of knowledge, an effective framework for international cooperation in projects funded by the EU and other agencies and advocacy vis-à-vis the EU institutions.
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