

Observing agricultural systems - sustainability and structural couplings

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Abstract

The article analyses the development in agriculture with a starting point in Luhmanns systems theory and with special focus on the concepts of decoupling and structural couplings. In a still more complex society reduction (or rather marginalisation) of complexity is a necessary but contingent development. In agriculture we see this development both in form of a differentiation of semantics and accompanying function systems and in form of horizontal and vertical specialisations and differentiations. The logical consequences of this are that, firstly, the umwelt of the individual organisation and function systems (that is, the world that they can be irritated by) are simplified, and thereby a range of decouplings take place. Secondly, it is necessary to develop new structural couplings between these systems to compensate for the differentiation.

A further consequence of the development is that there is a number of reactions in the surrounding world which begin to irritate back in other forms, and more specialised semantics emerge. The semantics that are differentiated into actual functions seek to reintroduce irritations of the farm enterprises, for instance by way of regulatory restrictions or taxes and dues. The analysis in this article focuses on other and new options for structural (re)couplings, based on a range of real initiatives and developments; couplings that can help reintroduce irritations from the surroundings to the systems. We distinguish three forms of structural couplings: 1) Functional couplings to additional generalised perspectives or functionally differentiated systems, which farm enterprises produce to reintroduce a sensibility of their surroundings. 2) Structural couplings between organisations, which can handle other dimensions than price and quantity. Here we distinguish between possibilities for mediated couplings offered by generalised media such as the organic label, and possibilities for network couplings that depend on and provide options for co-evolution. 3) Second order structural couplings to polyocular semantics based on observations of observations, such as the sustainability semantic; semantics that have their strength and challenge in the fact that they remain in an indeterminate form.

The analysis shows that Luhmanns concept of structural couplings is not only a strong tool to analyse and understand development processes in agriculture, but also a basis for working actively to solve the challenges that differentiation produces.

Introduction

Sustainability is one of the key semantics of modern society, and the development of sustainable agriculture is on the big challenges in Denmark and in the world. There are a range of different perspectives attached to sustainability, such as environment, nature quality, landscape, rural development and food security, and there are many different bodies that represent these perspectives in the efforts to ensure a sustainable development in agriculture. However, in practice it is difficult to get these perspectives to interact and to get a grip of sustainability problems.

The purpose of this article is to investigate how Luhmann's theory of social systems, and in particular the concepts of functional differentiation and structural coupling, can be used to analyse sustainability problems, to understand what leads to sustainability crises, and to form a basis for concrete tools to handle them.

The starting point for the analysis is the hypothesis that sustainability problems emerge as a logical consequence of differentiation and decoupling of different considerations in production and food chain. The initiating is therefore what form of development has led to this decoupling.

In practice this development must be seen as a number of concurrent processes concerning both the differentiation and emergence of new thematic semantics and perspectives in society, and the specialisation and differentiation of organisations and companies involved with regard to tasks and functions.

For analytical purposes, however, it is appropriate to distinguish these two kinds of processes. We will apply to strategies of analysis, one connected to semantics, general perspectives and functionally differentiated systems, and the other connected to operational specialisation and differentiation of organisation systems.

Development and differentiation of semantics in the field of agriculture and food

In the communication of society a multitude of themes emerge and separate, and some differentiate into distinct perspectives for observation and connected social semantics. These semantics can in time become institutionalised into specialised functionally differentiated systems. In this section we will analyse some of the key semantics that have emerged and become institutionalised in the field of agriculture and food, or which are of decisive importance for this field.

Based on Lars Qvortrup's (2002) table of functionally differentiated subsystems in society, we have listed some of the most important semantics around agriculture and food in Table 1. Apart from Qvortrup's categories, we added a category on theme/irritation. In part, this serves as a form of historical anchoring of the autopoietic genesis of these semantics, and in part it is a way of describing what sort of difference that was strong enough to be perceived as a difference and therefore differentiated into an autonomous semantic and a distinct perspective.

Table 1. Differentiation of semantics and functions in the field of agriculture and food.

Semantic	Theme/irritation	Code	Rationale	Function/service	Programme	Institutionalisation
Food	Undernourishment, malnutrition, life style diseases	+/- nourishment	Nutritional science	Ensure nourishment of the population	Food guide pyramid, Nutritional campaigns	Nutrition councils, Food institutes
Economy	Globalisation, competition, commodification of land	+/- profit	Economic rationality and efficiency	Increase exports, contribute to GNP	Agricultural deregulation, Efficient farming	Ministries of Agriculture, Agricultural associations
Environment	Silent spring, DDT	+/- pollution	Environmental science	Protect the common environment	Water plans, Environmental labels	Ministries of Environment, Environmental institutes
Nature	Extinction, many animals and plants becoming rare	+/- diversity	Natural history, biodiversity	Save rare animals and plants	Red lists, UN Convention on Biological Diversity	Nature conservancy councils Biodiversity institutes
Landscape	Loss of cultural landscape	+/- experience	Landscape aesthetics	Offer landscape experiences in the countryside	Landscape programmes	Landscape institutes
Food safety	Salmonella, BSE	+/- infection	Microbiology and toxicology	Reduce the risk of infection and poisoning	Husholdningsråd, National control programmes, Salmonella action plans	Food Safety Authorities, Veterinary and Food institutes
Rural development	Urbanisation, decline of rural areas	+/- country life	Cultural geography, rural development	Ensure life in peripheral regions	Rural development programmes	Rural development institutes
Eating	Loss of variation in season, varieties and qualities	+/- taste	Gastronomy, good eating culture	Increase culinary sense and skills	Chefs, Gastronomic competitions, Cooking books and TV shows	Madexperimentarium, Michelin Guide Gastronomic societies
Climate	Extreme weather	+/- greenhouse gas	Climate models	Prevent climate changes, Reduce impacts of climate change	Climate action plans, The Kyoto Agreement	The EU Directorate-General for Climate Action Climate institutes and centres

These genesis and differentiation processes have not taken place at the same time. Some have their root far back, while others are quite new. We have attempted to list them in the historical order that they unfolded and closed themselves as independent semantics. In Denmark, for example, the food semantic was institutionalised in form of the state household council ("Statens Husholdningsråd") back in the 1930's (Source), while the climate semantic only really manifested itself in the 1990's (Source).

The individual semantics are, as autopoietic systems, dynamic. If we take the food semantic again, this was originally about avoiding undernourishment and malnutrition, getting the right diet, and making ends meet with the food available, and this was enforced in the shortage of basic foods in the 1940's. But slowly the focus of the semantic has changed to overnutrition and life style diseases. If we take the economic semantic, money and economy has been a key media in agriculture for a long time. But economic efficiency was not differentiated as an independent semantic until the 1970's, where there was a shift from an agronomic semantic on how to achieve the highest yields shifted to an economic seman-

tic on how to achieve the highest return on the invested capital and labour. This can be seen, for instance, in the change from the expression “has it been done properly” to “does it pay off”.

Most of the semantics have been institutionalised to such a degree, that they serve as generalised media. One can, for instance, trade in carbon credits, and environmental labels serve as a media in the relation between supermarkets and consumers.

There are two key semantics that are not included in Table 1, sustainability and organics. This is because these two are attached to what we may call *paradoxical observation perspectives*, in the sense that these semantics so to speak wish to take the whole into consideration. Since this is not possible, these semantics have to connect to a multitude of specialised perspectives, and they cannot close themselves like function systems proper, but have to remain indeterminate. Later, we will return to the importance of this key condition for sustainability problems, but first we will look at these problems through our second strategy of analysis.

Specialisation and differentiation of organisation systems

In this second analysis we will look into the operational differentiation of specialized organisation systems within agriculture and food.

There are at least three major parallel historical developments which are mutually conditional, but which it may be analytically appropriate to separate:

1. Vertical differentiation into more links of the food chain through specialisation of operations into autonomous organisations, such as the separation of piglets production and fattening pigs and the separation of slaughter operations and further processing.
2. Horizontal differentiation into separate branches of agricultural production, such as specialisation into pig production, milk production, beef production, egg-laying or arable farming, and the specialisation into pig, cattle and chicken abattoirs.
3. The differentiation of family farms into business and family life as two independent systems, each with its own logic.

Vertical differentiation

The vertical specialisation and differentiation can be described as two processes. One process is the genesis of more links in the chain. Take for instance the production of pig meat, where piglets and fattening of pigs have increasingly become divided into two different organisational systems, selling and buying piglets at marked prices, and the slaughtering and processing of pig meat have been separated into two or more different independent organisational systems.

The other process is the reduction of structural couplings. In the first phase of differentiation many structural couplings in terms of reciprocal agreements and dependency were formed, to compensate for the reduction of complexity – as we for instance find it in the first phase of the cooperative dairies

where the dairies were obliged to process and sell the delivered milk at the best price for the farmers. Gradually these dairies closed themselves more and more around their own business logic with an increasingly market based connection with the farmers. Today the Danish cooperatives are to a much greater extent hybrid forms between a cooperative and a joint-stock company, which also buy raw materials for processing at the bulk market. In particular, this development is seen at the input supply side where the “former” cooperative suppliers are almost decoupled completely and price and conditions are negotiated in the individual purchase situation. This means that members of the cooperative are no longer necessarily treated in the same way. These organisational developments mean that each organisation can increasingly concentrate on optimizing its own operations. However, the price of this decoupling is that the mutual loyalty of the members (links) in the chain diminishes.

Horizontal differentiation

While there has been a long historical process of vertical specialization and differentiation within agriculture, the horizontal differentiation, in particular at the level of primary production, is of relatively newer date.

Until the mid-1960s almost all farms holdings were mixed farming systems with a balanced production between plant, cattle, pig and poultry production. Where livestock fodder was produced on the farm, fields were used for grazing, and manure from the livestock production was spread on the fields of the farm. A number of simultaneous developments, including mechanization and the development of agro-chemical components, made a horizontal differentiation possible.

Within a decade there was an almost total specialisation and differentiation in different production branches, and the mutual bindings or structural couplings between the different productions branches diminished. Simultaneously, the professional and political organisations in the fields of pigs, cattle, poultry, eggs and plant breeding evolved as independent organisations.

If we look again at pig production, there was at first an internal differentiation between plant production and meat production at the farm, and gradually the two operations became more independent of each other and increasingly driven by different optimization rationales. The main purpose of the plant production was now not necessarily to feed the pigs, and the pig production did not necessarily have to adjust to the productivity of the plant production.

However, the Danish legislation has maintained a structural linkage in the form of farmland requirements associated with livestock production, which establishes a maximum number of livestock units per hectare. In recent years, there have been various approaches to decouple these bindings between land and livestock production as well, through measures such as biogas production and burning of livestock manure so that pig meat production to a higher degree obtains the same conditions as other industrial productions.

The differentiation into business and family life

The differentiation of family farms into business and family life is the last form of differentiation in this analysis. Agricultural production is increasingly decoupled from family life and the operational logic is thus changed to that of an independent company. This process of differentiation happens almost paral-

lel with the specialization process described above, but slightly delayed. There are a number of conditions (irritations) in the encompassing world which enable and stimulate this differentiation process. Again, mechanization has been a major factor; among others things it has made the farm wife free from heavy household obligations and freed (or forced) her to take up work outside the holding, and it has made the working hours at the farm more and more comparable to ordinary industrial working conditions. This means that family life to lesser degree is organised around the concerns of the production and farm operations. Another dimension of this differentiation and decoupling process is the marginalization of generational succession as a key perspective. We have in particular seen this in Denmark, where one of the major irritations stimulating this development was the strong structural development, leading to a reduction in the number of full-time farm holdings of around 10% per year since 1960.

This exclusion of the family life and successor perspectives has meant that the individual farming business now to a much larger degree is able to close its operations around a more short-sighted production and investment logic that aims to achieve the best return on the capital and labour invested in the production. This is also reflected in the fact that many agricultural holdings change their organisational form from family farms to partnerships or Ltd.

Reduction, decoupling and sustainability

The functional differentiation and the organisational specialisation and differentiation are synchronic and interdependent processes. The driving force behind these processes is the striving for reduction of complexity.¹ The three forms of differentiation of organisational systems within agriculture and food that were identified in the previous section, are based on different forms of reduction of complexity in systems operations:

1. reduction in the complexity of consecutive operations (vertically)
2. reduction in the complexity of parallel operations (horizontal)
3. reduction in the complexity of meaning, considerations and objectives

As described above, these three movements in terms of reduction of complexity free the focus of the production systems to optimize internal operations. It frees piglet producers to become more and more efficient in producing piglets, dairy farmers to produce more and more kilos of milk from each cow, the abattoir to reduce costs of slaughtering the individual pigs, etc. This increase in efficiency can be seen very clearly in the increase in productivity that has happened over the last 50 years (source).

However, simultaneously with this reduction of the internal complexity, these organisational systems also reduce the complexity of their Umwelt, i.e. the systems reduce the types of differences in the encompassing world that are allowed to irritate them, and there is an increasing degree of de-coupling.

¹ The complexity is reduced only from an internal systems perspective, but increased overall, and marginalisation of complexity may therefore be a better term.

The first form of reduction, which is related to the vertical differentiation into more links in the chain, means that the farm businesses less and less have to worry about what consumers think. Their *umwelt* is the processors and who will pay the highest price for the raw materials. This vertical differentiation makes it therefore possible to de-couple some of the quality dimensions that were previously mediated through the food chain, quality dimensions that may have been associated with long-term sustainability, like the housing condition of the piglet where the meat is from, the environmental effects of the vegetable growing, etc.

The second form of reduction, which is related to the horizontal differentiation into parallel production branches, means for example that pig meat production systems no longer have to worry about soil fertility and sustainable production of animal feed. The development within the agrochemical industry means that arable farming systems no longer (at least in the short term) have to worry about the crop-rotation related problems with weeds and pests, or worry about the availability of nutrients in the soil. Recycling of nutrients is often much more difficult and harder to control than the use of inorganic fertilisers. The horizontal differentiation allows a decoupling from processes like recirculation of nutrients and organic material and crop rotations that are to avoid pest and weeds and increase soil fertility, processes that are of central importance for the long-term sustainability of agricultural production.

The third form of reduction, which is related to the differentiation in the business and family life, means that agricultural production systems do not necessarily any longer allow themselves to be irritated by the succession problem and thereby the long term perspective of the holding, which makes the businesses more free to focus its decisions on what the best return of capital is in the short run.

In this form of differentiation a decoupling from the broader perspective of the succession of the family farm may occur, and thereby a decoupling from the concerns that includes long run sustainability of the farming practice.

These are just some examples of the *umwelt* reductions these processes entail, and thus the reduction of possible irritations the individual agricultural activity reacts on in relation to the internal organisation and management of the system. A logical consequence of these differentiation processes is that the agricultural praxis is generally moving away from a position that can handle the plurality of perspectives involved in the semantics of sustainability; and away from a condition where they are sensitive to irritations that are expressions of the various dimensions of sustainability.

An example to illustrate this problem is the decomposition of humus in agricultural soil as a result of monocropping and heavy mechanical treatment of the soil, resulting in a loss of carbon in the form of greenhouse gas emissions that contribute to global warming. The humus content of the soil is crucial for the natural fertility of the soil, but the agrochemical components in terms of fertilizers and micro-nutrients makes a decoupling from the soil fertility possible, and allows farm enterprises to not be irritated by changes in the humus content and therefore not to include these concerns in the decisions of internal operations. Only if the greenhouse gas emission is reintroduced as an irritation in terms of economical means or legislative means, can the concerns of the humus contents be reintroduced in the operations of the systems.

From a Luhmannian systems theoretical analytical approach we have shown that the sustainability crisis can be seen as a more or less unavoidable product of the processes of specialization, differentiation and decoupling which takes place, and that the general societal development moves us away from perspectives that can observe and handle the complexity of a sustainable development of agriculture and food production.

Sustainability and three types of structural couplings

As postulated above, decoupling of sustainability is as an unavoidable consequence of the differentiation processes that happens within the agricultural production and the food chains. It is therefore relevant to examine the possibilities for re-coupling and new-coupling to sustainability concerns, and whether such new structural couplings can help to manage sustainability problems.

In the first analysis we examined some of the semantics that have developed co-evolutionary with the organisational processes of specialisation and differentiation. Some of these semantics and generalised media, in particular the economy, have formed the basis for these complexity reduction processes. Other semantics, such as environment and landscape, have emerged as irritations resulting from this differentiation process, semantics that are often referred to in relation to the concept of sustainability.

Since complexity reduction in the differentiated systems is symmetrical with the increase of complexity in society, these reductions are irreversible. Therefore the sustainability problem cannot be resolved by a return to a former, more ideal state. A systems theoretical approach to deal with sustainability problems will be to seek to reintroduce the various concerns in terms of re-couplings between the systems in form of new structural couplings. A structural coupling is “the specific form in which the system presupposes specific states or changes in its environment and relies on them” (Luhmann, 1991: 1432).

In the following we will examine how these re-couplings can be obtained in practice through an examination of a series of examples of various initiatives. We will here divide these initiatives according to the type of structural linkage that are sought established:

1. Functional couplings: an organisational system that couples to multiple generalised semantic perspectives or functionally differentiated systems
2. Organisational couplings: Structural couplings between organisational systems
 - a. Mediated couplings
 - b. Network couplings
3. Second order couplings: Polyocular semantic couplings between functionally differentiated systems based on observations of observations, which organisational systems can couple with

Functional couplings

"Ethical accounting for livestock farming" (Sørensen et al. 1998) is an example of the first type of structural couplings, where a farming enterprise is striving to re-introduce a sensitivity to the outside world by re-coupling to generalised semantic perspectives. "Ethical accounting for livestock farming" is

partly built on ideas from the "Ethical accounting" developed by Pruzan and Thyssen (1994). However, in contrast to the "Ethical accounting", which is based on discourse ethics, "Ethical accounting for livestock farming" attempted to establish various objectified perspectives. Animal welfare was, for example, measured by a mixture of registrations of physical conditions, such as space for the individual cow, and objective states of conditions in form of absence of illnesses and injuries and various tests of anxiety reactions of individual animals; and the environmental state was included in form of nutrient and energy balancing accounts for the holdings.

The underlying idea of this approach is that each agricultural holding, as an iterative process, must be able to follow the development in how the farming practice affects the encompassing world in the various dimensions included in the accounting system, referring to the different semantics linked to the sustainability debate. In its original form, the "Ethical Account for livestock farming" has not been widely implemented, but there are elements of it that are prevalent in e.g. "Green accounting",² where in particular environmental and nature issues are in focus. Another example of such intra-organisational functional coupling is the concept of "Good Agricultural Practice", a set of guidelines developed by the Farmers Unions (National Committees Joint Committee 2005). Here the main aim is to re-introduce different considerations into operational management, which are not based on pure economic reasoning, but draw on references to e.g. pride and craftsmanship, and include considerations of values and concerns for employees, neighbours, consumers, livestock welfare, nature, landscape, and environment.

Organisational couplings

If we jump to the second type of re-couplings, the inter-organisational couplings, it is meaningful to distinguish between two types of inter-organisational structural couplings. The first type is *mediated couplings*, structural couplings between organisation systems which are mediated by the generalised media of the functionally differentiated systems. An example is livestock welfare mediated by the label: "Recommended by the Animal Protection association".³ Examples from the environmental semantic is the Nordic "Swan label" and the European "Flower label", both guaranteeing that the labelled product is the least burdensome within its category, takes into account your health, and is of good quality.⁴

The Danish "Red Ø label" for organically produced and processed foods also belongs to this category of examples of generalised media. But, as we will elaborate later, the Ø-label is not anchored in a single semantic from table 1, but is in itself a coupling between many semantics, including environment, animal welfare, health, social justice, fair trade, etc.

Common to the mediated couplings are, first, that they are dependent on the generalised media, materialized in the in terms of labels, and thus dependent on the underlying functional systems and semantics. Without continued communication about, for example, livestock welfare and without an institutionalization in the form of e.g. animal protection associations, the label would no longer have a communica-

³ <http://www.dyrenesbeskyttelse.dk>

⁴ <http://www.ecolabel.dk>

tive value – the binary code of the distinction between the labelled and the non-labelled would lose its meaning and importance.

Secondly, the individual organisational system is dependent on stable coupling possibilities. Take the example of the Ø label, where the organic food network around e.g. milk is dependent on stable reciprocal opportunities for structural couplings. At the level of primary production of milk the farmer must submit to some restrictions in the terms of rules and control that make labelling with the Ø label possible. The dairy must be able to handle the organic milk separately and process it in accordance with organic rules and guidelines, and the dairy must be able to pay a premium price for the milk to the farmer. The supermarket must be able and willing to make shelf space and placing available for the marketing of organic products. The consumer must be able to acknowledge the values and differences the Ø label offers compared to non-Ø-labelled milk, and in the light of this, choose to buy the more expensive, organic milk.

These reciprocal opportunities for couplings can have more or less complexity-reducing features. For example, the structural link between the organic dairy producer and Arla is mutually contractually bound. This means that the coupling is contractually demarcated from a free market mechanism, the dairy farmers are obliged not to sell organic milk to other dairies than Arla, and Arla is obliged to buy milk at a stipulated price in relation to price of conventional milk.

This leads to the other type of structural couplings between organisations, which can be labelled as *network couplings*, and which not only makes use of the generalised media, but, so to speak, creates its own band width in relation to communication between the organisations that are mobilized into the chain. An example is the increasing numbers of so-called alternative food networks; networks that may well be referring to generalised semantics, but also develops an internal semantic about the differences between inside and outside the network as a basis for coupling along the chain (Noe and Alrøe 2011). An example of such networks are the French AMAPS, which are consumer-driven food supply networks, where the network directly negotiates price, quality and supply with the involved farm enterprises, and where a series of mutual expectations and ties makes these continued negotiations possible.

Second order couplings

The above discussion of the Ø label as a generalised media takes us to the third form of structural couplings, which we have chosen to call couplings of a second order. Couplings of a second order are linked to a polyocular semantic based on observations of observations (Noe et al. 2008). Second orders couplings are thus related to the type of semantics, such as organics and sustainability, which somehow want to take the whole into account, and couplings of a second order is a way for systems to deal with the paradox of taking a holistic perspective. Organisations can couple to these polyocular semantics but in a more paradoxical and reflexive way than described under functional couplings.

Organics as semantic differs from sustainability, by the fact, that the organic semantic has closed itself in terms of the Ø label as a generalised media accompanied by underlying rules. But at the same time this closure paradoxically contradicts the desire for a holistic approach that is at the core of the organic semantic. According to the organic semantic, the Ø label does not in itself constitute a perspective. You cannot tell whether an agricultural holding is more or less organic, without to elaborating this via cou-

plings with other generalised perspectives, such as whether it is more environmentally friendly, healthier, tastes better, or whatever.

A point is therefore that the difference between organic/not organic is both determined by the Ø label and at the same time must remain indeterminate. This indeterminateness shows up in the continued efforts within the organic organisations to develop new rules and principles for organic farming (see, for example, Luttikholt 2007, Alrøe et al. 2005). The semantic associated with the Ø label as a generalised media therefore constantly has to strive to maintain this second order communication, and thus fight against the movement towards simplification that will reduce organic farming to just being an expression of the rules, and see the Ø labelling only as a guarantee that organic food products are produced under certain restrictions in relation to production and processing (Alrøe and Noe 2008).

This leads to us to the concept of sustainability and the associated semantic. Sustainability is not easily differentiated to a functional system and a generalised media, although it is often used as such in structural couplings between, for example research system and the research grant bodies, where the notion of sustainability often reciprocally expected to be included in the overall objectives of the research proposal.

The concept of sustainability is also often referred to as part of the new speech rhetoric (Harste 2008), drawing on buzz words and not on binary codes. Moreover, there are also many competing semantics in relation to obtaining the hegemony of the concept, some of the more prominent of these is the economic, biological and social semantics or schools as they often are referenced to in the literature (see e.g. Alrøe et al. 2006).

But rather than seeing this paradox, that the semantics of sustainability cannot offer a generalised media for structural couplings, as a problem, we can perhaps from a Luhmannian perspective argue that it is precisely the potential strength of the sustainability semantic, that it can only maintain itself as a polyocular semantic, whose input is observations of observations (not observation of observers). Only by maintaining this hyper complexity, the hyper sensitivity in relation to the encompassing world can be maintained.

If the semantic of sustainability should succumb to the temptation to be institutionalised as a functional system, for instance by way of establishing a fixed indexation system (e.g. in the form of an indicator system) that sums up to a single relative or absolute sustainability scale, the semantic will stiffen and thereby also lose the value and contents of the indicators, and the value as a media for structural coupling.

This paradox is one of the main challenges in projects that aim to develop assessment tools to be used as generalised media based on "holistic" semantics such as sustainability and organics. An example is the MultiTrust project, which examines the possibilities for developing a multiperspectival approach to make comprehensive assessments of the various development initiatives in the field of organic farming (Alrøe and Noe 2011).

Conclusions

In a still more complex society reduction (or rather marginalisation) of complexity is a necessary but contingent development. In agriculture we see this development both in form of a differentiation of semantics and accompanying function systems and in form of horizontal and vertical specialisations and differentiations. The logical consequences of this are that the Umwelt of the individual organisation and function systems (that is, the world that they can be irritated by) are simplified, and thereby a range of decouplings take place.

The greater efficiency of the individual system coupled with a lesser sensitivity in relation to the encompassing world that the system affects, have increasingly given rise to communications about the sustainability of this development and a number of semantics about the relationship between agricultural system and its surroundings have emerged.

With references to a number of present initiatives and movements, we have analysed the opportunities for structural (re)coupling that can contribute to the re-introduce possible ambient irritations to the systems. We distinguish three forms of structural couplings: 1) Functional couplings to additional generalised perspectives or functionally differentiated systems, which farm enterprises produce to reintroduce a sensibility of their surroundings. 2) Structural couplings between organisations, which can handle other dimensions than price and quantity. Here we distinguish between possibilities for mediated couplings offered by generalised media such as the organic label, and possibilities for network couplings that depend on and provide options for co-evolution. 3) Second order structural couplings to polyocular semantics based on observations of observations, such as the sustainability semantic; semantics that have their strength and challenge in the fact that they remain in an indeterminate form.

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