The characterisation of the Danish e-business Aarstiderne as an alternative food network: A case study

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Executive summary

The object of this case study is Aarstiderne, a Danish organic food company delivering 30 000 boxes per week. The study aims to characterise this company within the context of alternative food chains, using specific environmental, economic and social criteria. During the course of the study, 19 interviews were conducted with company members, clients, suppliers, and researchers. In addition, a life cycle analysis and a price comparison for two box types were conducted. The results of the study focus on the environmental, economic, and social impacts of the company on its stakeholders throughout the food network. These results indicate how the company can be characterised in relation to other alternative food chains, with specific attention paid to how this food chain addresses some limitations of supermarket and Community Supported Agriculture food distribution models. Lastly, a comparison of the company's own ideals to its practices is made and some suggestions for improved coherence between ideals, practices and impacts on sustainability are put forth.

Preface

When we first heard of Aarstiderne, we were highly surprised. Those of us coming from North America were used to box systems based on the Community Supported Agriculture (CSA) model and we were interested in knowing how Aarstiderne differed from this model. Those from southern Europe were enthusiastic about the success the model has had. We were all eager to learn how such a system could have evolved to deliver almost 30 000 box per week. Thus, when we were asked to make an extensive report on a topic of our choice, as part of our ecological agricultural course at KVL University in Denmark, the topic was clear in our minds: Aarstiderne.

To begin with, we wanted to understand how Aarstiderne worked as a food chain and what its impacts on the Danish organic sector might be. We all feel that the organic world lacks a strong and organically minded food network and we wanted to investigate the extent to which Aarstiderne was achieving such a role. What was different, what was new and how was it successful in terms of environmental and social perspectives? Most of the attention to organic agriculture has focused on organic production methods and not on the distribution of organic food. Being all from foreign countries, we were also very pleased to be able to learn more about the Danish organic system as a whole. Our impression at the outset was that the Danish model was an example for all of Europe, being an organic leader at least in terms of market share.

Overall, we felt that this study was very interesting and we learned a lot during the process. We hope that the work we did can be a useful resource for comparison purposes as well as a relevant source of information for anyone interested in conducting deeper research on the topic. For those of us who expect to become organic farmers in the future, it was a fruitful way to gain real knowledge on the strengths and limitations of organic food supply systems.

Acknowledgements

This work would not have been possible without the extraordinary help from many within the company itself. Specifically we must thank Aarstiderne's student mentor, Niels Haastrup who generously, quickly and efficiently answered our questions and directed us to other contacts within the company. It was a great pleasure to work with someone showing such a commitment. We also thank Thomas Harttung, who nearly skipped his lunch at the Joint Organic Congress in Odense to generously talk with us about Aarstiderne's history, achievement and vision. Finally, to all the staff of Aarstiderne who gave us their time: Christian Møller, Philip Thestrup, Thomas Nielsen, Per Stilling Andersen, and Svend Daverkosen, thank you very much for the incomparable help you provided.

We also wish to thank the six producers, former and current suppliers of Aarstiderne, who generously give us a little of their time, which for a farmer is always a limited resource. Thank you for your brilliant reflections and your willingness to speak freely about your concerns and your relation with Aarstiderne. The conduct of our study also required the input of Aarstiderne customers. Many thanks to those who participated. We address a big thanks to Naomi Hirst who received our Aarstiderne boxes, and helped up with the sometimes messy business of weighing the fruits and vegetables. Thanks Naomi for your elegant help and also for your concern about packaging! Thanks to Chris Kjeldsen who gave us a new perspective on the subject. Thanks also to Christian Coff who proved to be a valuable resource and contact person for this study. Because the object of our study was a Danish company, we had to face Danish documentation, and we would like to thank our Danish translators, Theresa and Maria, for their very useful work without whom this study would have missed some crucial things. We also wish to thank Jesper Luxhøi who helped us with the phone and car logistics. Last, but certainly not least, we must address a big thanks to our supervisor, Vibeke Langer, who gave us feedback and comments at many stages of our working process, even when faced with serious time constraints.

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Introduction

In recent decades, facilitated by cheap energy and efficient transport technologies, a globalisation of food supply chains has occurred and fresh food is now shipped all around the world (O'Hara and Stagl, 2001). All the food consumed around the world is now transported, on average, a distance 50% greater than it was in 1979 (Sundkvist et al, 2005). This tendency is also witnessed in the organic food sector and, according to Halberg et al (2005), it "*threatens to dilute the special characteristics of organic farming*". This phenomenon has modified the global agricultural picture and has profoundly changed the relations between the actors along food chains. These impacts of globalisation on food chains can be divided in three broad categories: environmental, economic and social impacts.

The environmental impacts of globalisation are a growing concern.

> "[The] *global sourcing of food produce, centralized distribution systems, and shopping by car have become prevalent in recent decades and have contributed to an increase in the distance between producer and consumer or 'food miles.*" (Jones, 2002).

The increases in transportation of food, trading and even cross-trading contribute to increase the greenhouse gases emissions and global climate change. Also, in the organic agriculture context, globalisation and the growing interest of industrial and corporate interests have resulted in a weakening of the organic standards that might eventually lead to "arguments about the benefits of organic methods" (Allen and Kovach, 2000).

The economic consequences of globalisation may be no less severe. One of the consequences of food globalisation is that "FSCs (Food Supply Chains) are often dominated by oligarchies" (Watts et al, 2005), creating an important price pressure on farmers around the world. For example, in Denmark, where the organic food supply chain is for the most part merged with the conventional food supply chain, the Danish organic vegetables growers are economically pressurized by the disproportionate power exercised by the retailing node of the food supply chain (Kledal, 2006a). This pressure is exercised by charging the farmer with various direct costs such as marketing fees, account opening fees, box renting fees, etc. These fees and the fact that supermarket chains are advertising for and competing on price of some common organic vegetables such as carrots and onions, puts pressure on farmers and can drive some of them out of business. For example, from 2000 to 2003, the land used for organic vegetables growing in Denmark decreased from 1054 to 729 hectares (Kledal, 2006a).

The growing food globalisation also has consequences on social interactions. It contributes to "*the concomitant loss of social and biological diversity*" (O'Hara and Stagl, 2001) and enhances "*the social construction of individuals as consuming objects*" (Watts et al, 2005). The de-localisation of food production and distribution and the fact that production and consumption of food are separated in time and space

has made the transmission of information from the producers to the consumers very inefficient (Sundkvist et al, 2005). In addition, of the lack of transparency within globalised food chains has led to a lack of trust within many consumer populations (Coff, 2006). Moreover, globalisation of food chains is causing a steady decline in the number of farmers in developed countries, thereby contributing to a disintegration of rural communities.

As a reaction to this, and in order to promote a more sustainable system of food distribution, alternative food networks are growing in importance, for the distribution of both conventional and organic food. In Denmark, alternative sales channels are responsible for 20% of the organic sales and the e-business Aarstiderne alone has a 30% share of the market for all organic vegetables (Kledal, 2006a). Watts et al. (2005) suggest that these alternative distribution networks, notably in the form of short food supply chains, are necessary to avoid the possibility that organic product consumption becomes only a matter of health and food taste, thereby forgetting the important aspects of environmental conservation, market embeddedness and rural development. In this case study, the company Aarstiderne will be evaluated in relation to these facets of their food chain. Criteria linked to the environmental, economic and social sustainability of food chains will also be explored and used in this case study.

Considering the limited time available to do this project, we deliberately chose to exclude the production methods of organic vegetables from our study, except for an overview of Aarstiderne's. Rather, a description of the company and the characterisation of Aarstiderne as an alternative food chain, with reference to environmental, economic and social impacts form the body of this paper. The report begins by considering the relevant literature context, including pertinent criteria for evaluation on environmental, economic and social aspects. This is followed by the methodology employed for the gathering of data. Then the results are presented in four sections: the first presents a portrait of Aarstiderne, followed by the results for the environmental, economical and social aspects. Finally, we conclude with a discussion concerning four themes: the place of Aarstiderne within the context of alternative food chains, Aarstiderne's potential to answer the limitations of other food chains, the discrepancies between the company's vision and its activities, and the relative value of environmental, economic and social impacts in the company's decision making process.

An introduction to Aarstiderne

Before reading this report, it is important to clearly understand the object of the study. Aarstiderne is an e-business founded in 1999 in Denmark by Thomas Harttung and two co-founders. The company now employs 110 people and delivers organic fruits and vegetables boxes to the doorstep of 30 000 Danish households weekly. The company also owns three farms, one of which is used for large-scale organic vegetable production. The two other farms are primarily used for activities aiming at "[…] *raising the awareness of sustainability and food quality, reconnecting people with the natural world"* (Aarstiderne, 2006). In total, the company offers 12 distinct fruit and vegetable assortments. They also offer boxes with fish, meat, cheese, beer,

wine, bread, dry goods and even cosmetic products, although these represent a smaller fraction of their sales. The company uses the internet as their major selling platform; although they do offer a telephone service for comments and ordering. Aarstiderne relies on non-conventional marketing strategies such as word of mouth, media coverage and public events in order to reach new customers.

The goods in the boxes come from all over the world, with an emphasis on Danish products when sufficient quantity and quality are available. The company has a centralized distribution system. All fruits and vegetables arrive at a location in Jutland, are packed in individual boxes, and sent to a Zealand terminal to be dispatched in small vans for home-delivery. Around 80% of the boxes are delivered to the Copenhagen area. At Aarstiderne, "*The products are supplied with recipes and stories about growers, production, farms, the company, food products and quality*" (Aarstiderne, 2006).

Literature context and evaluation criteria

The purpose of this section is to place the subject of this case study, the company Aarstiderne, within a literature context. Based upon this literature theory, the criteria necessary for evaluation of this food chain are developed and explained. This section begins with an introduction to alternative food chains and includes some relevant definitions and clarifications. Following this, three sections, discussing germane environmental, economic and social theories, are presented. Within each of these sections, a literature background is followed by discussion of criteria to be used for the evaluation of results. This discussion of criteria can be read as a theoretical methodology for the evaluation of alternativeness and sustainability within each of the environmental, economic and social sections.

An overview of alternative food chains

It is necessary, before going in depth into the characterisation of food chains, to clarify the concept of an alternative food chain (AFC). Renting et al (2003) explain the concept as follows:

> *"AFCs, by their nature, employ different social constructions and equations with ecology, locality, region, quality convention and consumer cultures".*

In other words, alternative food networks are defined by the fact that they are different from conventional, globalised food chains. This alternative character can change the interactions between the food chain and its stakeholders in one or more of the environmental, economic and social facets of the food chain.

Even if alternative food chains are not by default more sustainable than conventional food chains, increased sustainability, equity or fairness is the aim when creating an alternative food chain. Alternative food chains combining social, environmental and economic factors are "*utopian: pointing to a future better world*" (Watts et al, 2005), just as perfect sustainability is also an abstract ideal. Therefore, the characterisation of alternativeness will be made in reference to some criteria used to define sustainability.

It should be noted that within the literature, the expressions 'alternative food chain' and 'alternative food network' are used to describe these new food distribution channels. Even if some authors may have specific reasons to exclusively use one or the other of the terms, we feel that overall they are used interchangeably and therefore we will employ both terms synonymously. As an introduction to the context, and to give a clearer picture of what constitutes an AFC, a description of four types of alternative food chains follows.

Community Supported Agriculture

Community supported agriculture (CSA) is an alternative type of food chain in which producers and consumers share the risks and the benefits associated with vegetable growing. Consumers are shareholders of the farm's harvest; they pay in the spring for the vegetables to be received, usually weekly, in the following summer and fall. Information meetings are often organized to recruit new members and discuss the production for the coming season. The baskets, of which the content is decided by the growers according to availability in the fields, are picked up by the consumers at the farm or at a drop-off point close to where they live. This model is seasonal, because only the produce of the local farm is included in the baskets. It is usually, but not necessarily, based on organic agriculture.

Farmers' markets

This is an old model, widely disseminated in southern Europe and around the world. This can be a daily or weekly event where farmers have a stand and sell directly to consumers. Specific markets for organic products can be separated from conventional markets, or they can be mixed. The products sold are for the most part locally grown, though often with an abundance of imported products during off-season. Farmers may sell their own production as well as the production of many farms.

Farm shops

Farm shops are usually managed by the farmers themselves and their main objective is to sell the produces from the farm. On the other hand, some farm shops have a wider product range and are comparable to a natural food shop. They often have restricted opening hours, are sometimes seasonal and are more commonly located on farms that are close to cities or in relatively densely populated areas.

Other Danish box schemes

Box schemes in Denmark are similar in some ways to the CSA model with some notable differences. Consumers often pay one month in advance for the boxes that are delivered to their doorstep weekly. The boxes are delivered all-year-round. Imported products and products from other farms are added to the box when not grown or not available at the farm.

Theory on environmental impacts

In this section we address the environmental impacts of Aarstiderne as an alternative food supply network. We define the limits of the system that is evaluated and we formalize a method to assess environmental impact by describing some specific environmental criteria.

Introduction to life cycle analyses

Environmental impacts of company practices have become more and more relevant in recent years. Consequently, methods to measure environmental impact have become more formalised. Life cycle analysis (LCA) is a process by which the environmental impact of the whole life of a product is estimated (Andersson 1998). It

involves all the components of the product. It details the production, the storage, the packaging and the distribution of each component. It can include post-buying effects, such as storage by the home user or the cost of recycling. In addition, the LCA can include environmental impacts that are measured in other ways, such as in terms of water consumption, energy consumption, gas emissions, toxic waste production or any parameters that are characterized in a way that allows monitoring. Not every LCA includes all of these aspects.

Numerous examples of products that are the subject of LCAs can be found in the literature, such as tomato ketchup by Andersson & Ohlsson (1998), frozen peas by Green and Foster (2004), dessert apples by Jones (2002) and many others. These studies show that a considerable part of the energy consumption of a particular good is in its transport. Among the parameters used to quantify such impacts are the mega joules (MJ) (Jones 2002) and the CO_2 emissions (Andersson & Ohlsson 1998).

The definition of boundaries of the system is also variable between different LCAs; some studies concentrate on the production, others on the distribution while still others even integrate the production tools. This would include, for example, the energy required to build the machine that are part of the production process of the item studied. The versatility of LCA can make them hard to compare. Therefore it is very important to clearly define the system boundaries and the measured characteristics.

System boundaries

In this part of the case study, the environmental impacts of the Aarstiderne food chain are addressed. The bulk of the analysis uses the LCA framework. The boundary of the system is the enterprise itself. The focus is on the inner component of the company as well as the company's functions: product supplier, services provider, internal operation, service production and client interaction. As shown in figure 1, every aspect of the chain is taken into account, from the moment the company purchases a product until the moment it reaches the client's doorstep. This includes the travel to the packaging facilities, the travel from the packaging facilities to the distribution facilities, and the travel from the distribution facilities to the customer's door. The internal components of Aarstiderne are also included within the system. Note that the production aspects and the consumer disposal of the product are outside of the system.

The system boundaries are therefore not limited to the operation conducted by Aarstiderne alone; the geographical locations of the suppliers are taken into account as well. The production aspects of the items are explicitly excluded, even when Aarstiderne is the producer, because our focus is on Aarstiderne as a food distribution network. For comparison purposes, variations that may exist in the environmental efficiency of different production methods within or outside of Denmark are ignored. We feel we are justified in doing this because the producers and the cooperatives of producers from whom Aarstiderne buys, also sell to other food supply chains, for example the supermarkets. Consequently Aarstiderne's distribution system can be compared with the distribution system of other food supply chains, by assuming that the average environmental impacts of production in the two systems are similar.

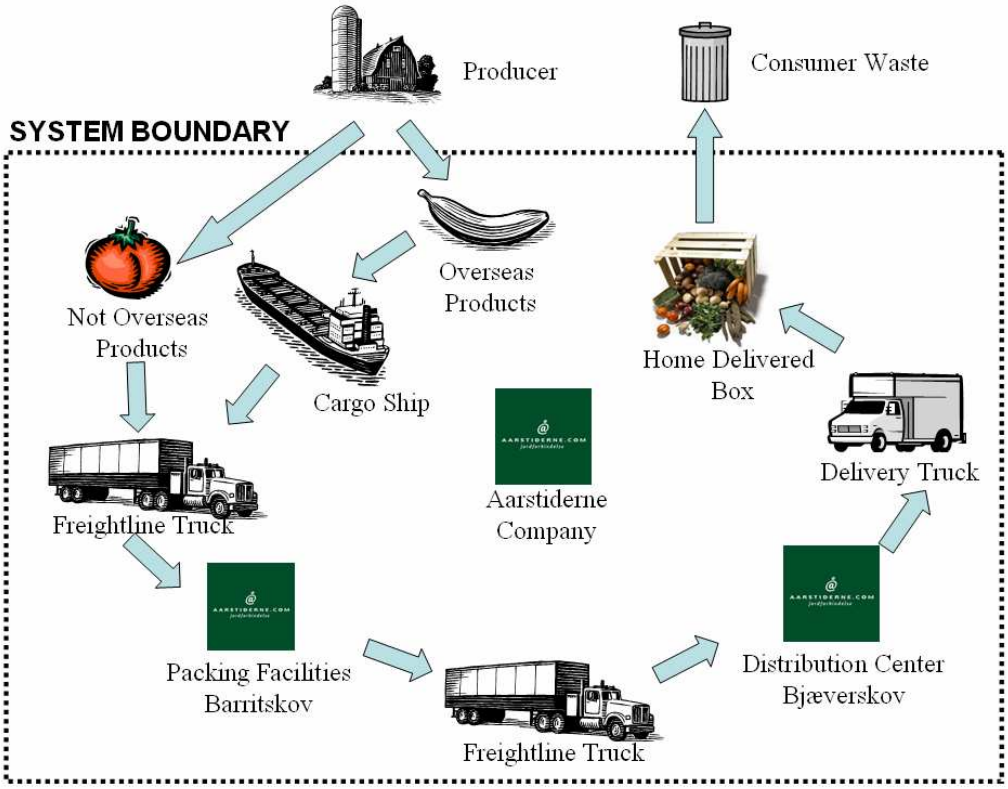

Figure 1: Environmental impact: system boundary

Evaluation criteria

Now that the boundaries of the system are defined, criteria used to measure environmental impacts are discussed. Criteria can be either quantitative or qualitative. Quantitative criteria refer to measurable aspects such as the amount of fuel consumed, while qualitative criteria are expressed on a gradient of non numerical value, such as the importance of Aarstiderne's conservation land in the European context. The interpretation of quantitative criteria can be straightforward as long as the scale or the comparison parameter is clearly defined. For example, the evaluation of energy efficiency for a given food product can be measured in mega joules per kilogram (MJ/Kg) and the comparison can thus be made between the total energy required to bring the food to the table and the energy content of the food. If the energy requirement to grow, transport, package, and deliver the product to the client exceeds the energy content of the product itself, then the system cannot be considered to be efficient since the product gives less energy then it uses. However, in this study the preceding evaluation is inappropriate because vegetables contain not only energy, but also vitamins, fibres and numerous other chemical compounds that are beneficial to human health. These advantages cannot be expressed in term of energy, preventing comparison based on their sole energy contents. The chosen evaluation criteria are presented in table 1.

Table 1: Criteria for evaluation of environmental sustainability of Aarstiderne

Criteria	**Type**	**Description**
MJ / kg of food	Quantitative	Energy consumption by transport, storage and packaging for the *Dogma Kassen* and the *Stor MixKasse* in MJ per kilogram of food
CO_2 g /kg of food	Quantitative	CO_2 emission by transport of the *Dogma Kassen* and *Stor MixKasse* in grams per kilogram of food
Compost production	Quantitative	Amount of compost produced and usage
Wood box use	Quantitative	Energy balance of the wooden box life cycle
Waste	Quantitative	Amount of generated waste that is not recycled in any way
Recycling	Quantitative	Weight of material sent to recycling
Water management	Quantitative Qualitative	Amount of water used by the company Management of wastewater
Habitat preservation	Qualitative	Conserved habitat and its importance in the European and Danish contexts
Eco building	Qualitative	Care about the environment in building design

The first two criteria, energy consumption for transport, packaging and storage in MJ/kg of food and CO_2 emissions per kg of food, are common components of the LCA of a product. The energy consumption includes the energy used in transportation, packaging and storage. The CO_2 emission is based on the transportation only. The system boundaries specifically exclude the production and the waste management by the customer, in order to concentrate on the importation from the supplier, the storage, packaging and distribution up to the consumer door. A comparison is made between two different box schemes: the *Dogma Kassen* and the *Stor MixKasse*. The former because it is based on locally (Denmark) grown goods, the later, the *Stor MixKasse*, because it is the company's best selling box. Therefore, the *Stor MixKasse* is considered as the typical Aarstiderne box. A comparison of the energy consumption of the distribution system in terms of MJ and CO_2 emission for the two boxes is given. These values will be available for further comparison with other distribution systems. Numerous sources are available for MJ and CO_2 consumption. In this study, the data used to calculate the energy consumption and emission of the different transport vehicles are those given by Dutilh (2000), Gerbens and Leenes (2002) and Lang and Heasman (2004) and in the UN Atlas of the Ocean (2006). A summary of these data can be found in appendix A and appendix B. The lowest consumption values are used in order to make a best case scenario for the long distance transport efficiency.

To further the comparison, a third fictive box is created as part of the results of the environmental section. This hypothetical box contains the same products as in the *Dogma Kassen* but all the products are assumed to be grown on one farm and distributed in a radius of 50 km around that farm. Also the packaging has been removed; all the vegetables are in the box directly without any packaging. It is presumed that the reduction in the number of manipulations will keep the freshness at least equal to the freshness of the *Dogma Kassen* vegetables. This box is called the

Micro Local Kassen, a name inspired by Thomas Harttung's personal vision of the post-oil decentralised society (A14_Aarstiderne, 2006).

The next group of criteria is concerned with the management of waste within the company. As highlighted in the sustainability report guideline (GRI, 2002a), the amount of materials used, and more dramatically the amount of waste produced, has considerable environmental impact in the form of water, soil, and air pollution. In this report, an evaluation is done of the environmental cost of the used materials, the amount of recycling of these materials, and the amount of non reusable waste. In addition, the water sent to the water treatment plant is considered. Both quantity of materials and methods of disposal are considered. This will generate values for the amount of compost, wasted water, recycled material and waste per kg of food in a box.

The last evaluated aspects are the impact of the company's decisions on environment conservation. An investigation of the importance of their conservation area in the European context in terms of area and biodiversity is completed. The question of environmental consideration in the design of new buildings is also considered. This can be looked at in terms of solar radiation use, building orientation according to wind, water management, material properties and others. These results are of a qualitative nature and help to understand the company's commitment to reducing their environmental impact.

Theory on economic impacts

This section aims at describing the criteria that can be used to evaluate the economic impacts of a food chain. A discussion of economic sustainability and alternativeness is narrowed to the context of food chains. This is followed by an exploration of how the use of conventional food chains for the marketing of organic products and the globalisation of the organic market are linked to the conventionalisation of organic agriculture. The starting point for this can be the recent loosening of the organic standards, which has made it possible for already intensified farms to convert to organic. De-localisation can result in weakened communication along the food chain and induces a price pressure on organic growers. As a result of economic pressure, intensification of production gives rise to environmental concerns. From there, the possible ways to characterize economic alternativeness of a food chain are described. The action mechanisms of these characteristics are also evaluated. Drawing from these guidelines found in the literature, the specific criteria used in this project are clarified and adapted.

Economic sustainability and alternativeness

Characterizing the economic alternativeness of a food chain can only be done in relationship to other food chains. In this case study, we are interested in comparing Aarstiderne to conventional retailers, who are responsible for 80% of the organic sales in Denmark (table 2). To achieve this, key criteria are identified in the literature as important to characterize economic relationships along a food chain (between producers, retailers and consumers).

The term economic sustainability, taken out of the sustainable development context, can de defined simply as the “maintenance of economic capital” (Van Der Bergh and Hofkes, 1998). This definition does not correspond to what we wish to evaluate here; rather we take economic sustainability as seen in the sustainable development context. The economics of sustainable development can be defined as working towards intergenerational equity and non-decreasing welfare (including environmental quality) (Van Der Bergh and Hofkes, 1998). An interesting view of economic alternativeness or sustainability is that “trade relations should have a long term perspective” (IFOAM, 2000). These interpretations of economic sustainability are used to focus this work.

Table 2 : Channels and their market shares for organic food in 2002 (Kledal, 2006b)

	Market share of organic Products (%)	Share of the total organic sale (%)
Big hypermarkets	4,3	7,0
Discount	4,5	22,5
Medium hypermarkets	4,8	15,8
Supermarkets	4,5	30,5
Mini markets	3,2	4,2
Alternative sales channels	29,7	12,6
Others	6,3	7,3
Total	5,0	100

The Global Reporting Initiative (GRI) is an independent institution working on the development and dissemination of the sustainability guidelines for voluntary use by organisations. They are also cooperating with the United Nations Environment Program (GRI, 2006a). In the 2002 sustainability reporting guidelines, GRI explains how to interpret and use its economic sustainability indicators:

> *"[…] economic indicators in the sustainability reporting context focus more on the manner in which an organisation affects the stakeholders with whom it has direct and indirect economic interactions. Therefore, the focus of economic performance measurement is on how the economic status of the stakeholder changes as a consequence of the organisation's activities, rather than on changes in the financial condition of the organisation itself."* (GRI, 2002a*)*

Therefore, this section does not focus on criteria and literature for the evaluation of companies' economic status but on how to evaluate their impact on other organisations and groups of individuals having direct and indirect relationships with them, which might include the suppliers, consumers, employees, providers of capital and society (GRI, 2002a). Overall monetary flow (money spent by the company for supplies, services, wages, taxes, etc.) is identified by GRI (2002a) as an important core indicator of economic sustainability. Use of this indicator would require extensive knowledge of Aarstiderne transactions. Also, these indicators are designed to provide an idea of the scale of the relationship between the company and its suppliers, employees, consumers, providers of capital and political bodies. As this type of quantification might not be of great significance in this case, we choose instead to describe the monetary flow for one typical Aarstiderne box. This allows a comparison between the price paid to producers and by the consumers, which in turn is used to evaluate the cost of this distribution system and the portion of the product value-added taken by Aarstiderne.

As it might be more interesting and potentially more feasible to look at Aarstiderne's impact on stakeholders by taking the stakeholders point of view and the company vision, we take into consideration the Economics Optional Indicators suggested by the Measurement Working Group (GRI, 2002b). They describe the performance

indicators as the "customer perception of whether relationship brings economic benefit" and the "supplier perceptions of value of relationship in economic terms".

Economic alternativeness of food chains

Many organic standards do not capture the idea of holism at the source of organic farming. This contributes to the emerging phenomenon of conventionalisation of organic agriculture (Allen and Kovach, 2000). By looking at most recent development of the IFOAM standards, Woodward and Vogtmann (2004) conclude that

> "*we have lost the principle that organic agriculture should be based on the concept of whole organisms that maintain their integrity – at all levels – whilst being part of a larger whole*."

In other words, the holism of organic agriculture has been pushed aside. By breaking the organic principles into their parts, the possibility of input substitution emerges; intensified farms convert to organic, leading to price pressure on farmers and decreased ecological soundness. Allen and Kovach (2000) also argue that the capitalist dynamics and the growing interest of agri-business in organic farming will eventually lead to further loosening of the organic standards, enhancing this conventionalisation process by the same mechanism.

The conventionalisation of organic agriculture is manifested in various ways, notably in the increasing concentration and specialisation of farms, the shift to capital intensive farms (associated with increasing debt), a decrease in nutrient cycling (reliance on inputs) and the increasing globalisation of the market (Halberg et al, 2005). Sundkvist et al (2005) associate intensification, specialisation, distancing, concentration and homogenisation of organic agriculture with the current marketing channels used for organic products. Their analysis points out that actual market trends, because consumers and producers are "separated both in time and space", inhibit efficient feedback signals. Feedback loops usually act as regulatory mechanisms, either by slowing down or by enhancing a given change. In the absence of an effective information flow in the actual organic markets, problems along the chain are either unknown or ignored by the other actors in the food chain, leaving them growing out of control. Coff (2006) also points out that the lack of information about the production process and history of the food available in stores is the cause of this increasing price pressure on farmers; consumers, confronted with the lack of information, choose food on the only apparent criteria: price. This communication issue limits the development of sustainable food chains

This problem can be seen as a cycle where the conventionalisation of agriculture, allowed within the standards, puts economic pressure on producers, encouraging them to intensify their production method, further conventionalising the organic sector. Figure 2 was developed to illustrate this cycle of conventionalisation.

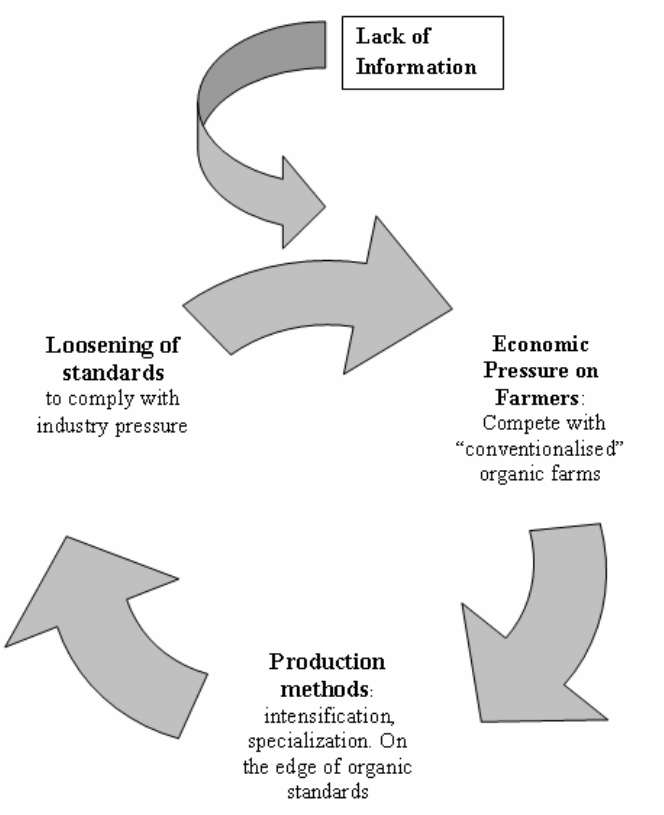

Figure 2: The cycle of organic agriculture conventionalisation

Guthman (2004) writes that "at least in California, agribusiness involvement amplifies already existing dynamics that constrain the ability for even the most committed organic growers to farm in more sustainable ways". In this context, the cycle is endless. Many growers and researchers foresee that the conventionalisation of organic agriculture will diminish the real differences between organic and conventional production and products and thus shrink the price premium due to harsh competition.

Criteria to evaluate alternativeness and economic sustainability

Finding criteria to describe an economically alternative organic food chain is not easy. Most literature about alternative food chains focuses on environmental and ecological aspects. But, as demonstrated above, economic and environmental aspects are deeply embedded. Therefore practices that can reverse or slow down the cycle described above are the basis for criteria for economic sustainability. "From the producer side of the agrofood chain, the emergence of new food supply chains should also be seen in the light of the continuous and increased pressure on farm incomes" (Renting et al, 2003). In general, practices reducing economic pressure on organic farmers and allowing them to build their assets and improve their ecosystem could be seen as working towards sustainability.

Verhaegen and Van Huylenbroeck (2001) evaluate this economic pressure by investigating the costs and benefits of participation in innovative marketing channels for producers. Their criteria take into account the revenues (not only the price but

also the quantity sold per unit area or time), direct costs (including labour, commercialisation costs), transaction costs (with regard to time needed to find information on the market and negotiate) and uncertainty (about prices and quantities sold). Using these criteria we can assess the costs and benefits of business with Aarstiderne for suppliers' economic status and also attempt to evaluate if they are able to "reassert farm-level control over their production decisions" (Hinrichs, 2000). Trying to evaluate the bargaining power of suppliers is particularly important in the case of box schemes; because the company determines the content of the boxes, the bargaining power of farmers may be at risk. This is because customers may not realize the possible substitutions made in the box because of disagreements between the company and one or a few of its suppliers (Kledal, 2005).

Another way to evaluate alternativeness to this cycle of conventionalisation is through investigation of purchase motivations. Specifically, we are interested in whether consumers are motivated to choose their food on criteria other than price alone. AFCs are often described as being able to "resocialise or respacialise food, thereby allowing the consumer to make new value judgements about the relative desirability of foods on the basis of their own knowledge, experience or perceived imagery" (Renting et al, 2003). Short food supply chains generally emphasize the relationship between consumers and producers and "the role of this relationship in constructing value and meaning, rather than solely the type of product itself" (Marsden, 2000). Therefore, price elasticity of the box is also considered by investigating motivations of customers behind the purchase choice and the importance of the price in their decision.

To further the argument of Sundkvist et al (2005), nearness would also increase food chain sustainability if it contributes to a better flow of information from the land, through the producer, to the consumer and vice-versa. Therefore, it is important to evaluate the amount of information the producers have the opportunity to communicate to consumers through their marketing channel, and vice-versa. This could be achieved through branding, which creates a trust relationship between the farm and the consumer through the product itself. "Re-establishing trust between producers and consumers" and "contributing to, and seeking just remuneration for, the maintenance of regional landscape and identity" were reasons cited by producers for their involvement in the local food sector, proving that this link between fair remuneration, information, trust and nearness exists and is recognized by growers (Morris and Buller, 2003). Bridging consumers and producers can also be achieved through other types of social interaction (using Aarstiderne website, phone, newsletter, activities, media, etc.); this will be further investigated in the "Theory on social impacts" section of this report.

Another aspect of economic sustainability to be evaluated in this case study is the company's selection process of suppliers of imported produce. As the production of certified organic products in the developing countries is driven by the developed countries demand, there might be a discrepancy between the production methods used in such countries and the original idea of organic principles (Halberg et al, 2005). Therefore, it is asked whether the adherence to the holistic aspect of organic agriculture is taken into consideration when the company is choosing suppliers

abroad. As time, resources and data access are limited, no attempt is made to evaluate the actual performance of suppliers abroad regarding sustainability.

To evaluate the economic impact of a food chain, its influences on the conventionalisation of Danish organic agriculture is considered. The costs and benefits of making business with this marketing channel, from the consumers and the suppliers' perspectives, are also evaluated. Finally, the economic pressure put on the farmers, its symptoms and the factors enhancing and alleviating is described.

Implementation of evaluation criteria

To assess Aarstiderne economic sustainability, we must develop a method of evaluation based on the criteria defined above. This method identifies which questions must be answered in order to evaluate each criterion. It therefore details who was contacted, what questions were asked and what other information sources were used to complete the evaluation.

Impact on the structure of organic agriculture

First, to evaluate the economic sustainability of this food chain, we wish to evaluate to what extent Aarstiderne participates in, or is an alternative to, the conventionalisation of organic agriculture. Therefore, company policies, vision and strategies are compared to the debates in conventionalisation. By doing so, the impact the company may have on conventionalisation of organic agriculture in Denmark was evaluated. As it is out of the scope of this project, the impact of Aarstiderne on the development of organic agriculture in other countries is not evaluated.

To assess this first criterion, two main perspectives are used: the company's point of view and the former and current Danish Aarstiderne's suppliers' point of view. An attempt was made to assess the influence of Aarstiderne' business policies, requests and behaviour on the size and level of specialisation of the Danish farms involved. To achieve this, the farmers were asked if their relationship with Aarstiderne drives any change on their farm, if it impacts their decisions and management practices and in what way. Aarstiderne's employee responsible for purchasing and imports was asked to describe the selection process of the suppliers in Denmark and to describe and explain the changes in their supply sourcing over time. The farmers' perceptions of those changes are also considered.

The selection process and criteria of import suppliers is described to find out if adherence to organic agriculture principles is considered. This relates to the fact that, as demand is driven by the developed countries in the developing countries producing organic food, the adherence to organic principles is sometimes not the main motivation to convert to organic and the price premiums and increased revenues become more dominant.

Cost-benefit analysis

Costs and benefits of this distribution channel for the farmers are also evaluated. This was done by interviewing the current and former suppliers of Aarstiderne concerning their revenues, security, transaction costs, trust and general satisfaction with this food

distribution channel. In order to evaluate whether farmers are reasserting farm level control, we asked the suppliers and the company how and when selling agreements are made, how flexible they are and when payments are received. Evaluating the level of economic pressure put on the farmer gives an insight into how much the farmers are able to sustain and improve their farming and enterprise.

The benefits of this distribution channel for consumers, economic and otherwise, were evaluated by interviewing consumers on their perceptions. The company's view was also taken into account by asking them how they determine the prices for the boxes, whether they follow market prices and what benefits they intend to bring to their customers. Finally, the economic benefit to the customers was evaluated by comparing the price of the items in the box with the price of equivalent items bought through other distribution channels.

Economic pressure on the farmers

To further evaluate the economic situation of the farmers, we asked Aarstiderne:

- how they fix their prices paid to the producers
- how they compete with other distribution channels, mainly supermarkets
- to what extent they are willing, and actively do substitute imported products for Danish products.

We can also make an evaluation of this last aspect by comparing the origin of the items included in the *Dogma Kassen* with items sold in the other types of boxes.

A description of the possibilities for branding and conveying information from the farms to the consumers and vice-versa through Aarstiderne is part of the results. This was assessed by investigating:

- Aarstiderne's existing communication infrastructures
- the consumers' knowledge and experiences
- the company policy and vision
- the resources allocated to communication
- the perceptions of the suppliers on how their relationship to Aarstiderne influences their relationship to the people consuming the food they produce.

As explained above, information flow is important in economic terms because it can reduce the pressure on price, by shifting the focus to other factors influencing consumers' behaviour. It can also provide the producers with increased customer trust and fidelity, which is particularly important in order to increase their bargaining power in a context where customers do not choose every of the items they receive.

Theory on social impacts

As has been shown for environmental and economic sustainability, social sustainability can only be evaluated based on a complex and interconnected set of criteria. In the first formal discussions of sustainability, contained within the report of the World Commission on Environment and Development social sustainability was not specifically defined but was strongly linked to ideas of social equity. In relationship to food, the report focused on the importance of food security and made the assertion that the primary problem related to this was not food production but rather equitable food distribution (Bruntland, 1987). Therefore, from the beginning, the idea that "the food chain as a whole is the ultimate framework for a scrutiny of sustainability" (Cobb et. al., 1999) has played an important role in the search for social sustainability. Since then, the discussion of socially sustainable food chains has looked for food chains that provide an alternative to the existing, or conventional, model of food distribution. Many authors have labelled these as alternative food networks (AFCs) (Renting et. al., 2003; Watts et. al., 2005) or alternative agrifood initiatives (AFIs) (Allen et. al., 2003).

One of the main venues for the discussion of alternativeness has been the globalisation-localisation debate. The basic premise is that a more localised food chain can provide an alternative to the globalised distribution system associated with conventional agriculture (Stagl, 2002; Watts et. al., 2005). The mechanisms for this differ from author to author, but many agree that a local food chain can provide a more secure and equitable distribution of food by re-embedding the food market within the local society and thereby increasing trust and communication between actors (O'Hara and Stagl, 2001). Others see localisation as a means by which risks can be shared by the different actors within the system (Lamine, 2005). The concept of "foodsheds" has been heralded as a method to reconnect people to place, thereby recreating local food communities (Kloppenburg et. al., 1996, Butler and Carkner, 2001). Within the organic food movement, localised food chains have often been assumed to be the most sustainable method of distribution, in line with the original organic principle of working within a closed system and drawing upon local resources as much as possible (Hinrichs, 2000; Woodward and Vogtmann, 2004). Recently, however the automatic association of alternativeness with localisation, organic foods and sustainability has come under closer inspection (Ilbery and Maye, 2004).

Specifically, many authors have underlined the need to look more closely at what is meant by 'local' (Selfa and Qazi, 2005) and how this relates to alternative food networks. From within the literature, we have isolated three main discussions that attempt to clarify the relationships between local food chains, alternative food networks and sustainability. Firstly, certain authors have focused on the type of integration offered by localness, separating social integration from spatial integration (Kjeldsen, 2005). Secondly, some authors have focused on the level and type of producer-consumer link, which can be seen as an elaboration of what is meant by social integration. Thirdly, some authors have developed continuums of market alternativeness, such as from weak to strong (Watts et. al., 2005) or oppositional to alternative (Allen et.al., 2003). These three discussions can be used to characterize

the social impacts of an actor, such as the company Aarstiderne, along the entire chain from producer to consumer. Admittedly, these three debates are not mutually exclusive and it may be counterproductive to separate them from one another. However, it is hoped that from a compilation of characterisations based on these three debates, we can clarify the type of alternative food network that a given company fosters within society. The next three sections will further describe the important elements of these evaluation contexts, followed by an explanation of the relevant criteria used to analyse these evaluation contexts.

Localisation: Spatial integration or social integration?

Localisation of food supply networks has been defined mostly by what it is in opposition to: the globalised trading of conventional agriculture products leading to homogenised production methods as well as consumption patterns (O'Hara and Stagl, 2001). In this context, the most frequently cited examples of localised food networks are centred on being direct market venues. These include CSA projects, farmers markets, box schemes and other types of cooperative food distribution (Hinrichs, 2000). In particular, many authors have held up the CSA model as an example of how externalities of food production can be re-internalised in a local setting, by closely coupling producer and consumer (O'Hara and Stagl 2001, Lamine 2005). This re-localisation happens in both a spatial sense: food is consumed close to the site of production; and in a social sense: producers and consumers have face-to-face contact and communication between actors is maximised.

However, not all alternative food networks comply with this model of re-localisation. Importantly, global communication, namely via the internet, has made it possible to shorten food chains without shortening distance (Kjeldsen and Alrøe, 2006). Renting et. al. (2003) discuss short food chains within a range of spatial settings, highlighting the fact that 'local' is often more a quality designation rather than a spatial designation. In other words, a producer can sell her 'local' products around the world, via direct marketing on the internet or by mail, as was studied in the Scottish/English borderlands by Ilbery and Maye (2004). Thus, the designation of 'local' by the producers in this study did not necessarily reflect spatial integration, and may not have even included social integration either, depending on the level of communication between producer and consumer.

Selfa and Qazi (2005) further highlight that the notion of 'local' can connote different aspects of place, quality, or social relations, depending on the different actors within the food network. In their study conducted in Washington State, the authors interviewed producers and consumers concerning their notion of local. They discovered that whereas most producers used spatial boundaries to describe local, some consumers used social relations or quality characteristics to define 'local food'. Renting et. al. (2003) go beyond this by completely separating quality designations related to production methods (such as organic, free-range, and natural) from quality designations related to place of production (such as local, regional, on-farm processed). For these authors, short food chains can designate any of these quality characteristics, not only the spatially determined ones. This interpretation is particularly relevant when comparing social sustainability to environmental sustainability, for it can be seen that the quality of 'localness' can be separated from the quality of 'sustainable bioprocesses'. Together, these studies stress that the

typology of local, from various perspectives within the food network, is an important aspect of the reflection on social sustainability.

Thus, it can be seen that "local" is both spatially and socially constructed (Hinrichs, 2003). Therefore, spatial integration and social integration are two aspects of localness that must be decoupled when evaluating social sustainability. Kjeldsen (2005) has developed a useful figure to illustrate this, which has been adapted and reproduced here in figure 3.

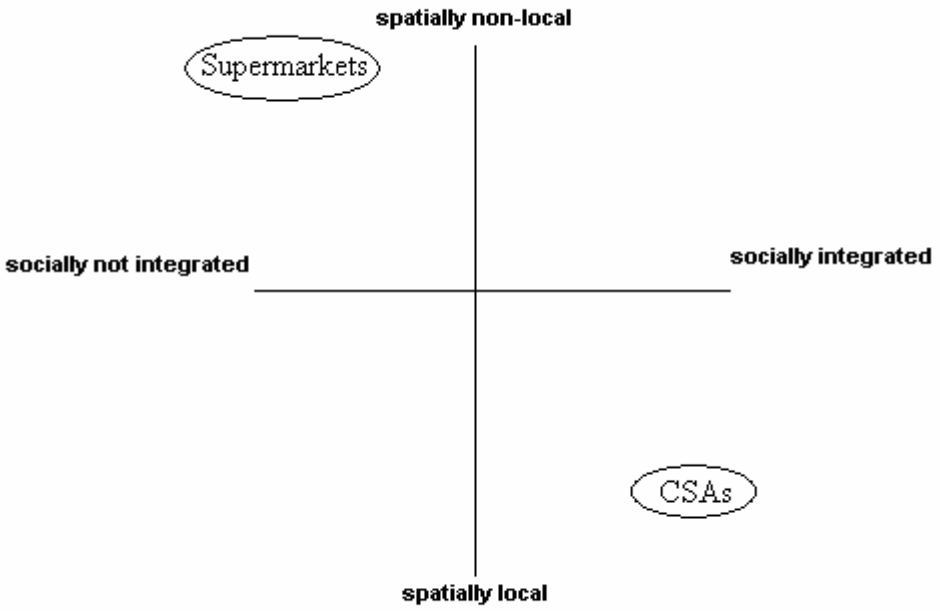

Figure 3: Spatial integration versus social integration

Along the y-axis, the degree of spatial integration is shown. Therefore, distant sourcing of food products would be placed in the upper portions of the graph while regional or local sourcing of food products would be placed in the lower portions of the graph. Along the x-axis, the degree of social integration is shown. Along the right side of the graph are placed initiatives that aim at increased communication, trust and networking between various actors of the food distribution chain. Along the left side of the graph are placed initiatives that discourage information transfer between actors. Two types of food distribution chains are placed on the graph, CSAs and supermarkets, in order to exemplify these concepts. Using this figure, it is possible to more specifically characterize the type of localness that a food distribution chain presents, avoiding the trap of conflating spatial integration with social integration.

Social integration: The consumer-producer link

Once a typology of localness has been conducted, it is then possible to more profoundly investigate one aspect of localness: social integration. Within a general context of social integration, the producer-consumer link has been the particular focus of many alternative food initiatives. The globalised food distribution system can be characterized as series of market-driven, anonymous interactions (O'Hara and Stagl, 2001). Recent food scares, such as BSE and foot and mouth, and rising concern for the environment have been partially held responsible for a general consumer distrust of conventional food distribution channels (Ilbery and Maye, 2004). On the producer side of the chain, decreasing commodity prices as well as the anonymity of selling through large supermarket chains has led many to pursue ways to market a value-added product (Morris and Buller, 2003). Together, this has led to a search for a stronger consumer-producer relationship within the context of alternative food networks.

The consumer-producer relationship is manifested, and can therefore be evaluated, through both the methods and the importance of communication between actors throughout the food network. This communication can include conversations (face-to-face, by phone or by internet), networking, marketing, surveys, events, etc. Vertical communication up and down the food chain, such as from producer to consumer, is taken to be an important criterion of social integration. In addition, some authors have also pointed out the potential for alternative food networks to instigate horizontal social integration, such as communication between two consumers (Stagl, 2002). Besides communication, social integration can also include networking and the development of trust between actors in a food network (O'Hara and Stagl, 2001). We feel that networking and trust can be viewed as the relevance of communication, i.e. the consequences of the communication. Trust can be seen as a manifestation of the importance of communication, while networking can be seen as an increase in diversity of communication avenues.

The content, as well as the transformative power of communication, are also important, however these provide the basis for the evaluation of alternativeness, which forms the third discussion context.

Type of alternative: Choice or change?

The third context of evaluation focuses on the type of alternative to the traditional market economy offered by the food network. Allen et. al. (2003) use the term "oppositional" to describe initiatives that "seek to create a new structural configuration" versus the term "alternative", which describes initiatives that are "limited to incremental erosion at the edges of the political-economic structures." This dichotomy is meant to elucidate the degree to which alternative food networks are fundamentally transformative of the global political-economic structure. In other words, "oppositional" initiatives provide an alternative *to* the market system, whereas "alternative" initiatives provide an alternative *within* the market system.

This dichotomy can be mirrored by the continuum proposed by Watts et. al. (2005) of weak to strong alternatives, in which weaker alternatives are more focused on specific quality variables rather than significant structural changes. Lastly, we can also relate the debate concerning citizen versus consumer to this characterisation of

alternativeness. In this perspective, a stronger alternative food network would be one in which the role of citizen was emphasized over that of consumer, through the extension of power and responsibilities, not just choice, to individuals (Delind, 2002; Coff, 2006). Together, a stronger alternative would provide a more embedded economy that is less market driven and more focused on shared risks and responsibilities between citizens.

To crystallize these concepts and facilitate discussion, we have grouped these concepts in figure 4. We have chosen to differentiate between initiatives that emphasize increased choice within the market and society and initiatives that emphasize a social or market change. Though this figure appears to present a dichotomy between change and choice, we use the arrow to remind the reader that in fact these concepts represent a continuum of alternativeness of agrifood initiatives.

Emphasis on Choice	**Emphasis on Change**
Alternative	Oppositional
Alternative *within* the market →	Alternative *to* the market
Weak	Strong
Individual as consumer	Individual as citizen
Increased choice (quality diversification)	Increased power and risk sharing

Figure 4: Alternativeness of agrifood initiatives

Evaluation criteria

It has been shown that there are multiple lenses through which to evaluate the localness, social integration and alternativeness of a food supply chain. To evaluate a company through these lenses we must investigate social impacts throughout the food chain. The company can be evaluated within the food chain through its philosophy and actions in regard to these indicators; however the concrete effects of these policies will be played out throughout the food chain. Therefore, we must look at both the supplier as well as the consumer. Using these lenses, it is then possible to develop a conceptual base of questions to ask the various actors within the food chain. These can be seen in table 3.

Table 3: Theoretical questions asked within three social theory frameworks

Perspective		**Consumers**[1]	**Producers**	**The company**
Local typology: Spatial integration v. Social integration		What is local? Are there benefits from local? Trust based upon what criteria? Which quality characteristics are important?	What is local? Are there benefits from local? Trust based upon what criteria? Which quality characteristics are important?	How much import? How far? Do they fulfil notion of local for producers and consumers? Which quality characteristics are promoted?
Communication throughout food network :	Vertical Horizontal	What is link to producers? How and what do you communicate to a producer? Communication	What is link to consumers? How and what do you communicate to a consumer? Communication	What does the company do to encourage the link? How do they facilitate information transfer? What type of information?

		with other consumers?	with other producers?	Foster trust?
Oppositional or alternative:		Change in awareness and behaviour (eating, buying)? Decreased importance of price? Feel/act as citizen or consumer?	Change in production? Change in relationship to market?	Emphasis on choice or change? Educational goals? Political engagement?

[1] *Note: All questions to consumers and producers are posed in the specific context of the Aarstiderne food supply chain, not in a context of an abstracted food supply chain in general*

Of course, the questions posed in this table are theoretical; in most cases, they are not the specific interview questions asked of the various actors. However, they provide a framework for the interpretation of the numerous interviews made with producers, company members and customers. By evaluating the perceptions of the various actors within the contexts of localness, communication and alternativeness we can better characterize Aarstiderne as an alternative food distribution network. Lastly, we can better identify those characteristics that are most relevant for social sustainability, as well as sustainability as a whole. At the same time, by recognizing that the three frameworks are also closely intertwined, we can also come to conclusions concerning Aarstiderne's social impacts throughout the food network that it has created.

Methodology

In order to characterize Aarstiderne as an alternative food supply chain, it was necessary to investigate actors along the entire chain, from the producer to the consumer. The research for this case study can therefore be divided into three main regions of the food network: within the company itself, upstream from the company, and downstream from the company. Within each of these focuses, a variety of research methods were employed. In addition, the primary research was placed in context by extensive secondary research. In order to be able to characterize the Aarstiderne food supply chain, it was necessary to use scientific literature as a basis for evaluation perspectives and criteria. The specifics of how environmental, economic and social evaluation methods were chosen and applied can be found earlier in this report, under the respective "Evaluation criteria" sections within the "Literature context and evaluation criteria" chapter.

Within Aarstiderne

Within the company itself, there were four main sources of information. First of all, visits to the Barritskov and Krogerup farms and the Bjæverskov distribution terminal were conducted. These visits were facilitated by the company and included guided tours of the premises and explanations of the operations at each site. In addition, the visit to the Krogerup site involved a participant observation of the Haver til Maver school children program. Data from this experience centred primarily on informal interviews with teachers, students and the program director.

Secondly, semi-structured interviews were conducted with various employees of the company. These interviews were conducted in person or by telephone or email when logistical concerns precluded face-to-face interviews. A list of persons interviewed and respective responsibilities within the company can be found within the reference list. The questions asked to Aarstiderne employees can be found in appendix C.

Thirdly, through the help of the student mentor within the company, certain written documents and data were obtained.

Fourthly, the Aarstiderne customer website was used as documentation for the company's public profile and philosophy. Due to language capabilities, the focus was placed on the English language section of the website; however the Danish language section was also roughly translated to insure a complete picture of the company.

Upstream from Aarstiderne

In order to investigate the upstream, or supply, side of this food supply chain, two main forms of research were conducted. First of all, semi-structured interviews were conducted with Danish suppliers to Aarstiderne. Because Aarstiderne recently reduced its number of Danish suppliers from more than 50 suppliers to 6 suppliers,

an attempt was made to interview both current and former suppliers. A total of 6 interviews were conducted, 4 with current suppliers and 2 with former suppliers. Due to the locations of these suppliers, these interviews were conducted by telephone, except for one interview that was conducted by mail survey. The questions used as the basis for these interviews can be found in appendix D and appendix E

The second form of research on the production side involved the gathering of data related to fuel consumption by method and distance for product travel and storage. To measure the energy consumption of a box we used the information available from Aarstiderne concerning the origin of the various products in the box. We also relied on Aarstiderne for information concerning the transportation methods used for the various products. Specifically, we looked at whether the products travelled by plane, train, freightliner or delivery truck. We weighed all of the items of two types of boxes, including the vegetables, fruits, packages, box, bag and letter for two consecutive weeks. Using this and data from the literature we computed the CO_2 emission and the energy consumption in MJ for each item to get a clear picture of an entire box. The data will reflect a box received by a client living in Frederiksberg, part of the Copenhagen area. Because Aarstiderne's clientele is primarily focused in the Copenhagen area it is appropriate to perform the calculations according to such a client. The numbers used for calculations of energy consumption can be found in appendix A.

Downstream from Aarstiderne

The investigation of the downstream, or purchase, side of the Aarstiderne food supply chain was based on customer interviews and supermarket price comparisons. Semi-structured interviews with current Aarstiderne customers were conducted. A total of 5 interviews were conducted, either by telephone or in person. These customers were found through contacts at KVL, and thus were not randomly selected. These customers consisted of three men and two women, who ranged in age from mid-twenties to mid-fifties. All of the interviewees shared their boxes with at least one other person (family members) and thus they shared opinions during the interview that may have been personal or may have reflected the opinion of other members of their families. The questions used as the basis for these interviews can be found in appendix F.

The second type of research on the downstream side focused on price comparisons between the food provided in Aarstiderne boxes and organic produce available in supermarkets. These supermarket price comparisons were carried out for two weeks of boxes. For each item in both the *Stor MixKasse* and *Dogma Kassen*, the same or very similar item was found in a supermarket. It was necessary to visit the following supermarkets to find as many of the items contained in the boxes as possible: Irma, Super Brugsen, Netto and Pure Food (a natural food store). For each item that was found the price was noted and a total 'supermarket equivalent' price was calculated.

Results: A characterisation of Aarstiderne

This section will present the results of the case study on Aarstiderne. It can be broken up into four parts. The first section provides a history of the company as well as a detailed description of how it currently functions. This is followed by the results of environmental, economic and social analysis.

Overview of Aarstiderne

The aim of this section is to give a clear picture of the company Aarstiderne. A description of the company itself will be followed by a portrait of the company's founder and current chair. The decision to speak about the founder was taken due to his importance as leader and originator of ideas within Aarstiderne. Therefore an understanding of this central figure is crucial to a full picture of the company. In both sections, we follow a chronological structure, in order to best show the evolution of the company as well as its trends for the future. The description of the company can be further divided into three sections: the first comprises the company's history, the second discusses important ideals and important concepts, and the third focuses on the functioning, working structure and farms of Aarstiderne. The information provided in this section comes primarily from interviews with company members as well as the Aarstiderne's English language website.

The company

The company, Aarstiderne A/S (hereafter referred to as Aarstiderne), produces, sells and distributes organic food. Aarstiderne delivers boxes of fruit, vegetables and other organic products directly to the doorstep of private households. Founded in 1999, today the company delivers to 30 000 customers, employs 110 persons and manages more than 1450 hectares of certified organic land (Aarstiderne, 2006).

History

Thomas Harttung, a farmer in Jutland, got the idea of a vegetable box scheme during a world organic conference in Copenhagen. During that meeting, Michael Ableman from Florida and Jan Dean from England made presentations of the new ideas related to Community Supported Agriculture and box schemes. Harttung was inspired by the idea and felt it was something that could be developed in Denmark and in 1997 founded the Barritskov Vegetable Garden (Barritskov Grøntshave in Danish). Barritskov Grøntshave was a non-profit company, with a structure close to the main ideas of the community supported agriculture in which the customer collects her box directly at the farm and pays in advance for the season. The box scheme began with 100 members and was only active for ten weeks of the year. There were several managerial problems involved with this arrangement and two years later Harttung and partners decided to create a limited asset to the company and to change the setting. This was the birth of Aarstiderne (A14_Aarstiderne, 2006).

Aarstiderne was founded by four people on the first of January 1999. One of these four, Thomas Harttung has been the main figure since the beginning, holding the majority of the company's shares at the start with a percent of the share around 90%

(A18_Aarstiderne, 2006). In 2001, the Triodos Venture Capital Fund, a 'green' bank, bought a share of 20%, which has since been bought back by the company in 2005. This bank had a seat on the Board, but limited decision control outside of this (A14_Aarstiderne, 2006). Another important figure within the company is Søren Ejlersen, a trained cook. As co-founder with Harttung, he was important within the company for his ability to understand what people liked. In the three years after the foundation of the company, a lot of investments in buildings, human resources, tools, cooling facilities, took place and the balance sheet was negative (A18_Aarstiderne, 2006). Since 2002, the company has reported a positive economic assessment (KPMG, 2006). Except for the year 2004, the company has seen a growing customer base every year. At the end of 2005, Aarstiderne had more than 30 000 customers. That translates into 30% of the market turnover of organic vegetables in Denmark (Kledal, 2006). In 2006, a growth of 10-20% is predicted (A15_Aarstiderne, 2006), partially due to the recent entrance in the Swedish market in the towns of Malmø and Stockholm.

Ideas, Mission and Important Concepts

> *The idea behind Aarstiderne.com is to deliver organic food products directly to the doorstep of the customer who values quality and taste and thereby creating a sustainable economy for the development of the company and its employees.* (Aarstiderne, 2006)

The mission of the company is the following: "Aarstiderne recreates the close connection between the cultivation of the soil and joy in meals that are full of good raw materials, health, taste and presence" (Aarstiderne, 2006) In addition, the company has key words that direct its policies. These words include: "Consideration, Quality, Creativity, Development, Growth, Transparency and Organic Farming" (Aarstiderne, 2006). We will consider the key concepts of organic, quality, communication and transparency.

Organic

The idea of organic is said to be at the base of everything. The company chair states that the company is "at the service of an idea", the idea being the organic principles (A14_Aarstiderne, 2006). Currently, the organic principles, as outlined by IFOAM are health, ecology, fairness and care (Woodward and Vogtmann, 2004). Aarstiderne defines itself as an organic company which is committed to minimizing fossil energy use, avoiding unnecessary form of pollution and using local resources to the greatest possible extent (KPMG, 2005). In addition, "the main idea is to make a sustainable system and it was since the beginning" (A18_Aarstiderne, 2006). All of the land managed by the company is certified organic. In addition, all suppliers and wholesalers employed by the company must be 100% organic, which means that Aarstiderne will not work with suppliers or wholesalers that deal with conventional as well as organic products (A17_Aarstiderne, 2006).

Quality

Very high quality of products is another goal of the company. High quality is valued in terms of taste and appearance diversity of items, and uniqueness of products

(A18_Aarstiderne, 2006). The company wants to be an alternative food chain where the consumer can find products not offered anywhere else (A14_Aarstiderne, 2006). These are some of the reasons which pushed the company to increase their own vegetable production by more than 38, 8 % in 2005 and to develop new products (KPMG, 2006).

Communication

For Aarstiderne, communication with its customers is a core point. If communication is not successful, then the ideas and goals of the company are irrelevant. Therefore, communication is also seen as part of marketing in an alternative way; telling stories is a way to maintain the customer base. The ideas behind this communication and marketing philosophy come from a revolutionary book concerning communication in internet era entitled The Cluetrain Manifesto. The first sentence of this book is "Markets are conversations", which is a motto that the company has implemented by calling its customer service department the "conversation department" (A14_Aarstiderne, 2006). This way of communication is intended to put the customer in a closer relationship with the company so that he feels he is a member of Aarstiderne. The company feels that proof of this membership feeling is evidences by the fact that the company's marketing surveys generally obtain a 60% reply rate (A15_Aarstiderne, 2006). For Aarstiderne, customers' calls are a resource to maximize, not something to limit (A14_Aarstiderne, 2006). In the "conversation department" there are more than 20 employees, and a huge amount of phone calls and mail are received every day. In 2002, 6 500 calls and 10 000 emails per month were received (Aarstiderne, 2006). Every week, 300 customers are interviewed to know their appreciation of the box, and in this way the box is developed, with an effort made towards making a compromise between what people want and what the company can offer (A14_Aarstiderne, 2006). The newsletter is another important method of reaching customers with words. In the newsletters that are delivered with every box each week, Aarstiderne provides recipes and tells stories about the products which are in the box.

The company's marketing department is connected to the idea of communication. Specifically, the company uses "word of mouth", internet marketing, outreach activities, and media events as forms of marketing. This includes events on the farm, street kitches, a TV documentary on Søren Ejlersen, and the Aarstiderne cook book, Rodrugterne (KPMG, 2006). Through these, the company is able to reach its target customers which are families living in the Copenhagen area with children, middle to high income and high educational level (A15_Aarstiderne, 2006). These "alternative" ways of marketing are relatively inexpensive for the company; in fact, Aarstiderne's marketing budget is only about 2 million DDK (A15_Aarstiderne, 2006).

Transparency

The website, newsletter, phone calls and media programs are various ways to promote conversation with the customer and provide information that the customer may desire. Beyond this, the company aims at "putting all elements of our work in the public domain we enable ourselves to communicate" which is further expanded to the desire that "the company will open its books - making all transactional information available to customers and suppliers. Everybody will know what we are

paying for carrots - how many carrots it costs to operate the box scheme and what margins the different boxes fetch on the doorsteps" (Aarstiderne, 2006). This is reflected in the key word of transparency. However, at the moment, the company does not provide full documentation of accounts. Therefore, the policy is currently unfulfilled.

Functioning of the company, company structure and company farms

The box scheme

The Aarstiderne box scheme is primarily conducted through the internet. More than 90% of the boxes are ordered online, via the company website (A15_Aarstiderne, 2006). All orders arrive in Barritskov where the packaging of the boxes is done. In the buildings of the farm there is the terminal for the delivery of fruits, vegetables and the packaging needed for the preparation of the boxes. There are approximately 85 people work at this site (A17_Aarstiderne, 2006) and pack around 28 000 to 30 000 boxes a week. Most of the products delivered are placed in boxes the following day and are delivered to the customer on the third day. In other words, goods are received from Sunday to Tuesday, put in the boxes from Monday to Thursday and delivered from Tuesday to Friday. For some products, like lettuce, the processing time is shorter and it is put in the box the same day as delivery. For a few hardy products in which storage is possible, the processing time may be longer.

Aarstiderne offers the choice of around 30 different content-decided boxes each week. These boxes are primarily fruit and vegetable boxes but also include a fish box, meat boxes, wine boxes, bread boxes, etc. In addition, Aarstiderne prepares special fruit boxes for companies, which they deliver on Mondays. The majority of the boxes start from Barritskov and are transported to the Bjæverskov terminal by truck where are sorted into smaller delivery vans that are able to the delivery in the Copenhagen area where almost 80% of Aarstiderne's clients are located. At Bjæverskov terminal, special request boxes are also made. Customers have the choice of over 600 products that they can fill a special request box with. For this service, the company charges a fee of 25 DKK. This activity is very time consuming but the company feels that it is important to give more choices to the customer (A17_Aarstiderne, 2006).

In Denmark, goods are collected from Aarstiderne directly at the suppliers' farms. Around 40% of the company's fruits and vegetables come from Denmark; however this is 50% in terms of money. When fruit is excluded, 65% of the vegetables are sourced from Denmark (A17_Aarstiderne, 2006). Goods from other countries arrive in Barritskov by freightliner truck. The delivery is done using delivery vans, and in one working day each van usually delivers up to 170 boxes in the Copenhagen area. The delivery is done at the doorstep of the customers. In the case of apartment buildings the delivery person uses the key of the main entrance (A17_Aarstiderne, 2006).

Figure 5: Location of important Aarstiderne sites in Denmark

Other activities:
In the company's farm in Krogerup, Aarstiderne organises the Haver til Maver (translated as "From garden to stomach") school children program. The primary motive of this program is to provide schoolchildren access to a vegetable garden and the entire farm throughout the growing season. Classes participating in this program must visit the farm at least 8 times throughout the season, to insure that educational goals are accomplished. Approximately 300-400 children visit the farm per week in this program. During the visits the students are able to experience the countryside with the aim to give them freedom and space for self-expression. There learning goals are focused on connecting the elements of organic agriculture, nature and food culture in dynamic and hands-on way.). The school have to pay for this experience; usually a sum of 4000DKK for the entire season but the program is also financed by private companies and public agencies (A16_Aarstiderne, 2006).

The Krogerup and Barritskov farms are used as multi-functional gathering places. Both host visitors year round, offering them several ways to enjoy the land, the nature and the food. Dinners, activities with children, tours, harvest market, a Christmas, and Easter market are organized in both locations. Almost 18 000 visitors come to the Krogerup farm and over 10 000 visit the Barritskov farm each year. There is a countryside restaurant in Barritskov open for meals, workshops or weddings (A13_Aarstiderne, 2006). In Krogerup, ready-made meals are prepared

and delivered by a catering service. Aarstiderne also runs a sort of mobile kitchen that prepares food in the streets or in schools, with an educational aim. A past activity was an experimental program that collected organic waste from the houses of customers living in one area of Copenhagen. This waste was composted and distributed on the fields.

Financial statement
Harttung is the majority shareholder and chairman of Aarstiderne A/S and Søren Ejlersen is the only other shareholder with a share equal or higher than 5%. Aarstiderne A/S is a parent company which exercises control by holding more than 50% of the voting rights on the following group enterprises: Billeslund A/S, Krogerup Avlsgaard A/S and Diverse Raavarer A/S. In 2005, the balance sheet of the company was positive by only 177 045 DKK and with a total revenue of 147 011 776 DKK. The purchase of the raw materials was the largest payment, equal to about 50% of the revenue. Other costs such as packaging, distribution, advertising, and administration account for another 30% and staff costs account for the final 20 % (KPMG, 2006). The increase in revenue has been constant from 2001 until now. Overall, financial indexes are good and the company shows a good financial wholeness, but net profit is not growing due to their high value of investments. The return on investments is very low, indicating that they are long term investments which are moreover increasing capital and reserves. Borrowed money from a bank is small compared to the turnover. Debts are well-balanced with credits and due to the box sales mode the company has a good liquid asset.

Company working structure
At the head of the company structure is a board of directors, with Harttung filling the role of chairman involved with the strategy of the company. There are two vice chairmen, one for innovation, Ejlersen, and another for finance. There is a chief executive officer who controls the 5 departments of the company, which are: production, which includes the pack house and packaging; logistics, which includes distribution and web management; customers, which includes sales and marketing, conversations, Krogerup food and events; and lastly finance and farm, which includes Billeslund, Diverse Raavarer, Krogerup, Maaltiderne, and Barritskov food and events. In total, Aarstiderne has an average of 83 employees.

Farms
A short description of the farms managed by Aarstiderne A/S, including their activities and main characteristics follows. The total area managed is 1450 hectares (Aarstiderne, 2006), which represents the largest organic reality in Denmark.

There are three farms, located in different places in Denmark (see figure 5). Right now each of these farms has a specific value and objective but the aim of the company in the long term, or over the next five to ten years, is to share activities and productions between all three. In other words, localisation will be the key word for the future (A14_Aarstiderne, 2006).

All of the following information is referenced from the interview A14_Aarstiderne, 2006.

Barritskov is the old core farm, where the first vegetable garden started. Right now it is no longer an important production centre of vegetables. Packing of boxes, storage of products, the restaurant and other activities with people are the current activities that predominate at Barritskov. On the 700 hectares there are almost 100ha with cereals and 200ha in "nature conservation" which is land that is only used for grass; cut or grazed and the remainder of the land is forest. There are no tractors in this particular farm, all machine jobs are done by farmers from outside the farm. It seems that the main activity here is to take care of the biodiversity and this is for two reasons: for the environment and for the people, customers and tourists. The 10 000 visitors coming every year to Barritskov is varied in motivation: there are public institutions, students and technically interested people, farmers interested in the nature plan, people who take a day off to enjoy the nature and company employees who have work-shops or relaxing activities in pleasant zones in the farm.

Like at all of the farms of Aartiderne, there is a "nature plan" in place at Barritskov. They have mapped the entire farm and have found the main things to do to increase biodiversity. These include the conversion to grazing of the majority of land of the farm, with more than 230 cows, the reintroduction of water in the fields and in the forest, and the planting of solitary trees in large open fields for refuge purposes.

At the **Krogerup** farm the total land is around 220ha, 80ha of which are rented from the Ministry of Environment and Energy (Aarstiderne, 2006). In this farm one farmer is employed who grows 120 ha of cereals, manages some grassland and takes care of the forest. In the beginning, the farm was rented for two reasons: to grow vegetables and to package the boxes for Copenhagen. But for logistic reasons neither activity is currently practiced to a large extent and so now Krogerup exists for visitors, for children and for anyone who wishes to enjoy it. There are almost 18 000 visitors per year and the plan for the future is to make the farm more enjoyable for the people, for example by reducing the size of the fields, growing flowers, and making more small vegetable gardens for the Haver til Maver school program.

Currently at this farm there are many activities not directly related with the production that take place. This includes the communication department, with more than 20 employees, a farm store, a kitchen organised for catering and dinners at the farm, occasional markets during the year, and also the Haver til Maver program.

At the **Billeslund** farm a total of 300 hectares are managed, of which 120ha are rented and the rest are owned by Thomas Harttung. This is the main vegetable garden of Aarstiderne. The production is rapidly increasing; 54ha in 2006 will increase to 120ha in 2009. All the land on the farm will be used for the rotation that follows: three years of vegetables, one year of cereals and one year of grass. There are 14 cows from another farmer that graze at Billeslund and this is expected to stay the same or increase in the future. Two people work at Billeslund full time throughout the year, which increases to 15 workers in summer and around 20-25 workers during the peak of the harvest. This farm is designed to be a farm able to survive in the future. Instead of being specialised in a few products, the philosophy is to develop new products, new varieties, and new techniques. They are not interested in doing what others are already able to do. They have many experimental programs, such as testing new varieties obtained with open pollination, and projects for the long-term

future include possibly starting fruit production and opening the farm to visitors, most likely in the form of vacationers.

Farm management
Here will be presented some information about the management of the fields. Of course, the farming ideas are related to the principles and standards of organic agriculture but they are also trying to apply the principles of biodynamic farming. The production aspect is seen as an investment for the future, therefore it is more oriented towards research, experiments, and new varieties as opposed to solely traditional production. Another point for the future is the possible implementation of technologies to reduce hand labour, such as a GPS system to automatically guide machinery.

Concerning agronomic aspects, in both cereals and vegetables there are currently no major pest problems. For vegetables, in the opinion of the agronomist, this is mainly due to two reasons: the choice of varieties, which is more on factors other than high yield, and the fact that they are growing vegetables in an area where vegetables have not been grown before. In the next years, with the expanding of cultivation in space and time, some diseases may appear. Right now the most important pests are caterpillar worms in cabbage.

The soil is fertilised with organic manure, deep litter and chicken manure (only in Billeslund). Amendments are applied on the order of one animal unit per hectare in Billeslund and 40-50 total animal units for all of Barritskov. The manure has been only organic since 2001. Concern for nitrogen and nitrogen leaching causes them to keep the soil “green” for more than 90% of time throughout the year and catch crops or green manure are used in the rotation the winter before vegetables. Soil compaction could potentially present another problem in areas where vegetables are grown for three years in a row, but still they do not have major problems except for some area in Barritskov.

Company plan for the future
In the future, an effort will be to increase the market in Sweden, where Aarstiderne would like to sell Swedish produce as opposed to exporting vegetables from Denmark (A14_Aarstiderne, 2006). Another strategic point of the company is to increase their own production. This is with the aim to raise the quality and the variety of the vegetables in the box and reduce costs of production. Right now in Denmark the price for organic food is relatively low and there are high costs involved with production and for these reasons there is a strong effort in developing the production strategies and techniques (KPMG, 2006).

The decrease in energy consumption is an important point for the company in terms of self-sufficiency and sustainability. They are currently monitoring the energy consumption system, looking for critical points to work on in the future (A18_Aarstiderne, 2006). The final goal of this is to be completely energy self-sufficient (A14_Aarstiderne, 2006). One big step in terms of sustainability will also be to avoid the use of plastic in the packaging, replacing it with more sustainable products. Lastly, in a very long term view, the company wishes to encourage more

street markets and other local channels as well as integrate many of the activities into all three farms (A14_Aarstiderne, 2006).

The founder

Thomas Harttung
The founder, inspirer and charismatic leader of Aarstiderne is Thomas Harttung. During interviews, Harttung demonstrated a brilliant, holistic view of his farm, his company and the world, now and in the future. His view is one in which reality, dreams and the future survive at the same time. His ideas and energy seem to be a sort of lifeblood for the company.

Harttung is a first generation farmer in his family. He grew up in the city in an industrial and cultural atmosphere. His family moved to Barritskov looking for a countryside life style, and so became what Harttung refers to as "gentleman farmers". In this climate, Harttung studied forestry and agriculture at the university in KVL in Copenhagen. He felt near to the idea of "close to nature forestry" and applied these principles to his 300ha of forest since the time when he took over the farm from his parents in 1984. Eventually, Harttung grew to feel that the idea of farming couldn't be conventional. Harttung felt farming is an expression of ideas and concepts, so he expanded the "close to nature" principles from the forest to the fields (A18_Aarstiderne, 2006).

In 1995, Harttung began the conversion of all the land, but without the intention to grow vegetables or implement a box-scheme. Then in a conference in Copenhagen, this changed. It was then that, through contacts with people from all over the world, Harttung was inspired to change and this led to the birth of Aarstiderne (A14_Aarstiderne, 2006).

Ideas
Harttung bases his philosophy on the principles of organic agriculture. He feels these are dynamic, an open source for free inspiration because organic is the most promising new system for the world. He sees Aarstiderne as a model of success that can create innovation and knowledge, but also can be fertile soil for the start of new companies or new ideas in the organic world, which he feels lacks a model of big success. In other words: "Our long term goal is to turn into a great compost from which new businesses can grow" (A14_Aarstiderne, 2006)

Harttung has also a view of the role of the farm in the community. The organic movement can develop this concept in different ways. He believes that direct sales, market farms, and street markets will help keep the contact between producers and consumers. The idea is that the farm can again be the centre of the food chain, turning into a family farm with background and complexity. To do this, a decentralisation of the production and the creation of 'foodsheds', as taken from Kloppenburg et al (1996), is important (A14_Aarstiderne, 2006). This decentralisation will be the key in the post fossil-fuel era says Harttung. In Harttung's thought, there is the idea to create direct connection between the diversity

and richness of production and the diversity of customers. Supermarkets act as a filter that reduced the freedom of choice of the customers. Harttung envisions “micro” production for the future, such as micro dairies, micro bakeries, and micro farms. This will form the basis for the reestablishment of the link between land, food and people. Furthermore, he sees that eventually everybody will grow their own vegetables. The town itself will be the best place to grow vegetables, providing infinity of surfaces on which to garden, such as balconies, terraces, and roofs, will give the possibilities for a self made production (A14_Aarstiderne, 2006). On the long term, Harttung says that when the customer is able to connect directly to the producer, Aarstiderne will no have reason to exist (A14_Aarstiderne, 2006).

Environmental impacts

In this section, the results of the environmental impact evaluation are presented. The results of the life cycle analysis are first presented followed by a review of Aarstiderne's environmental decision making for their internal operations.

LCA of the sampled boxes

The content of the analysed boxes can be found in tables 4 and 5. As can be seen in these tables, the three analysed *Dogma Kassen* contain 17 items produced by 10 different suppliers while the two *Stor MixKasse* contain 18 items produced by 10 named suppliers and 8 unnamed suppliers from 7 different countries. Note that the weight of the vegetables does not include the packaging; it is in a separate column. The *Truck* and *Boat* fields refer to the distance the vegetables have travelled before arriving at Aarstiderne's packaging facilities. The distances travelled by the boxes themselves to the company's distribution system are considered constant. The distance from the packaging facilities located at 34 Barritskovvej in Barrit to the distribution centre located at 7 Tingbjergvej in Bjæverskov is roughly 215 km. The distance from the Bjæverskov distribution centre to the typical Copenhagen client located at 1 Solvej in Frederiksberg is 47 km. Note that the boxes that are to be delivered close to Barrit are shipped directly from there by small trucks.

Table 4: Dogma Kassen and Micro Local Kassen[1] content

Product	Producer	Vegetable Weight (g)	Plastic (g)	Wood product (g)	Truck[2] (km)
		Week 21			
Lettuce	Billeslund	137	5	0	0
Radish	Billeslund	197	1	0	0
Jerusalem Artichoke	Krogerup Avlsgaard	998	8	0	295
Rhubarb	Lars Skytte Jensen	608	0	0	106
Cucumber	Lykkesholm	306	2	0	98
Tomato	Lykkesholm	573	0	28	98
Chili pepper	Lykkesholm	15	0	0	98
Cauliflower	Skiftekær Økologi	1041	0	0	152
Potato	Søris	2006	8	0	266
Mushroom	Ådalen	101	7	0	143
Bag	N/A	0	23	0	0
Box	N/A	0	0	1195	0
Letter	N/A	0	0	22	0
June 1st					
Lettuce	Billeslund	330	8	0	0
Melisse-lemon	DIVERSE raavarer	70	8	0	50
Cauliflower	Skiftekær Økologi Tåsinge	1180	0	0	152
Tomatoes	Lykkesholm	477	0	29	98
Pepper	Lykkesholm	121	0	0	98

Potato	Søris	1200	8	0	266
Green Onions	Billeslund	73	0	0	0
Courgette	Lykkesholm	218	0	0	98
Cucumber	Lykkesholm	410	2	0	98
Chili pepper	Lykkesholm	5	0	0	98
Bag	N/A	0	31	0	0
Box	N/A	0	0	1225	0
Newsletter	N/A	0	0	22	0
Week 23					
Potato	Søris	2003	7	0	266
Lettuce	Billeslund	349	6	0	0
Dill	Broendegarden	49	0	0	69
Eggplant	Lykkesholm	149	0	0	98
Chili	Lykkesholm	15	0	0	98
Zucchini	Lykkesholm	273	0	0	98
Tomato	Lykkesholm	583	0	29	98
Cucumber	Kaj Stengård	271	0	0	50
Rhubarb	Lars Skytte Jensen	405	0	0	106
Pepper	Lykkesholm	93	0	0	98
Bag	N/A	0	29	0	0
Box	N/A	1115	0	0	0
Newsletter	N/A	0	0	23	0

[1] *The Micro Local Kassen content is the same as the Dogma Kassen but the bag and all the packaging have been removed. The distances for truck are zero because all the vegetable are grown on site.*
[2] *The truck distance is the distance from the supplier to Aarstiderne packaging facilities and should not be confused with the truck distance from the packaging to the distribution centre or from the distribution centre to the customer doors, which remain constant for all products.*

Table 5: Stor MixKasse content

Product	Country	Origin Producer	Weight (g)	Plastic (g)	Wood product (g)	Boat[1]	Truck[2]
Week 21							
Apple	Argentina	Unavailable	580	0	0	18000	785
Pineaple	Costa Rica	Unavailable	1042	0	0	11000	785
Lettuce	DK	Billeslund	155	6	0	0	0
Radish	DK	Billeslund	210	2	0	0	0
Cucumber	DK	Lykkesholm	528	1	0	0	98
Mushroom	DK	Ådalen	144	14	0	0	143
Banana	Dominican Republic	Unavailable	708	0	0	9000	785
Eggplant	Holland	Ron van Dijk	302	0	0	0	785
Cabbage	Italy	Cooperativa Primavera	1122	0	0	0	2850
Lemon	Italy	Salamita	178	0	0	0	2710
Tomato	Spain	Cucho Verde Semillero	490	0	27	0	2950
Carrot	Spain	El Cortijo Bio	805	8	0	0	3000
Box	N/A	N/A	0	0	1141	0	0
Bag	N/A	N/A	0	23	0	0	0
Newsletter	N/A	N/A	0	0	22	0	0

Week 23							
Lettuce	DK	Billeslund	301	6	0	0	0
Carrot	Spain	El Cortijo Bio	804	8	0	0	3000
Cucumber	DK	Lykkesholm	340	2	0	0	98
Rhubarb	DK	Lars Skytte Jensen	450	0	0	0	106
Tomato	Italy	Unavailable	508	0	29	0	2500
Dill	Dk	Broendegården	49	0	0	0	69
Watermelon	Spain	Unavailable	1640	0	0	0	3000
Apple	Argentina	Unavailable	751	0	0	18000	785
Oranges	Egypt	Magrabi Agriculture	1075	0	0	6000	785
Tomato Cherry	DK	Lykesholm	145	0	8	0	98
Fennel	Italy	Cooperativa Primavera	285	0	0	0	2850
Bag	N/A	N/A	N/A	23	0	0	0
Newsletter	N/A	N/A	N/A	0	22	0	0
Box	N/A	N/A	N/A	0	1172	0	0

[1] *The boat distance is the distance from the supplier to Rotterdam port in Holland, the nearest port for trans-national import to Denmark. The distance is an evaluation that is likely to underestimate the real value.*

[2] *The truck distance is the distance from the supplier to Aarstiderne packaging facilities and should not be confused with the truck distance from the packaging to the distribution centre or from the distribution centre to the customer doors, which remain constant for all products.*

Table 6: Energy and CO_2 emissions per kg of food in various boxes

Type of box	**Week #**	**Net Weight (kg)**	**Energy (MJ/kg)**	**Emission (CO2 g/kg)**
Stor MixKasse	Week 21	6,27	3,9	184,3
Stor MixKasse	Week 23	6,35	4,5	181,9
Dogma Kassen	Week 21	6,04	2,0	54,4
Dogma Kassen	Week 22	4,14	2,6	55,2
Dogma Kassen	Week 23	4,19	2,3	55,4
Micro Local Kassen	Week 21	6,04	0,6	27,5
Micro Local Kassen	Week 22	4,14	0,7	29,8
Micro Local Kassen	Week 23	4,19	0,7	27,5

As seen in figure 6, the total energy consumption (as displayed in table 6) is the sum of the energy consumption for transport and for packaging. As previously mentioned, the energy requirement for storage has been removed from the calculation because Aarstiderne does not store fruits and vegetables for a significant amount of time. This is because they use the just in time method (JIT). The JIT method consists of ordering goods as they are needed. This system reduces the need for storage since a constant supply of goods is brought on site as they are required. This system implies a fast, cheap and reliable mode of transportation so that a constant flow of goods goes from one end of the chain to the other (from the supplier trough the wholesaler and distributor to the customer). The use of such a system may increase the use of less efficient transport systems in term of energy consumption in favour of quicker

and more versatile system but this subject needs to be further investigated. Consequently to compute our result we used the data for the most efficient system available for long distance transportation without taking into account the inefficiency that may be created by the use of the JIT model.

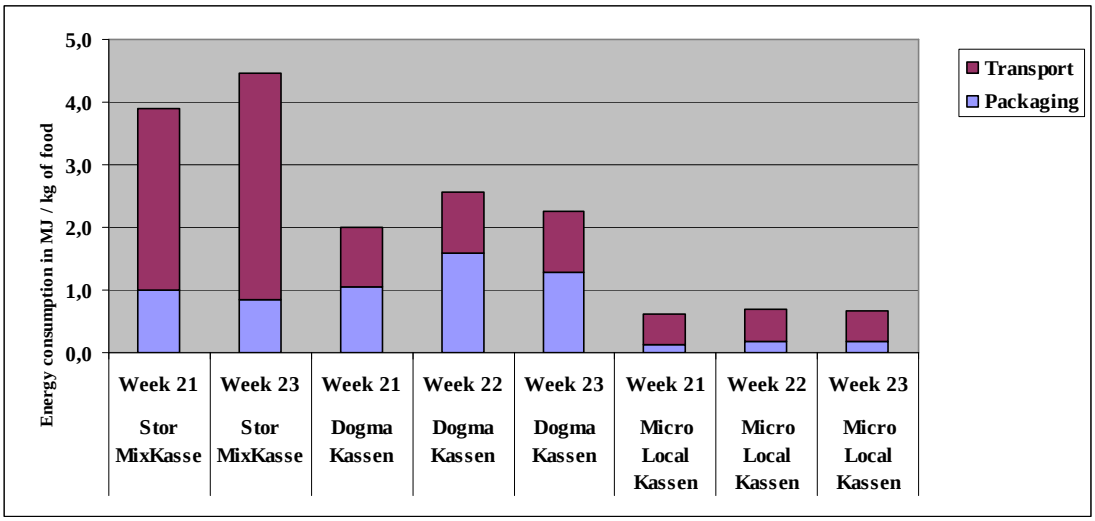

Figure 6: Energy consumption of the various boxes

The life cycle analysis of the *Stor MixKasse* and the *Dogma Kassen* indicate a clear difference in CO_2 emission and energy consumption between the two box types. The *Stor MixKasse* requires almost twice as much energy as the *Dogma Kassen* and the amount of emissions are three times as large. This result is directly related to the increased transportation required to compile the *Stor MixKasse* since the two box types contain very similar amounts of packaging. The *Micro Local Kassen* scenario, where all the goods are produced on farm and distributed directly to the customer in a radius of 50 km is the least energy intensive, with only 15% of the energy requirement of the *Stor MixKasse.* It is also very energy efficient compared to the *Dogma Kassen*; requiring only 30% of its energy. These results reflect the lower packaging requirement of the hypothetical box. As figure 6 shows, the packaging in the *Dogma Kassen* and in the *Stor MixKasse* accounts around 0,9 to 1,6 MJ per kg of vegetable. This figure shrinks to less then 0,2 MJ/kg in the *Micro Local Kassen, since* the only material considered as packaging that remains in this box is the newsletter.

The box itself is not considered as packaging since it is recuperated and reused by Aarstiderne. The weight of the box is computed as a mass that is transported and therefore it contributes to energy consumption and CO_2 emissions. Regarding the CO_2 emissions, it is seen in figure 7 that the *Micro Local Kassen* emits approximately half as much CO_2 as the *Dogma Kassen* and only 30% of the emissions of the *Stor MixKasse*. These results strongly suggest that the *Dogma Kassen* is much more energy efficient then the *Stor MixKasse* but they also show that the hypothetical *Micro Local Kassen* could achieve a significantly lower consumption of energy while emitting much less CO_2 in the atmosphere.

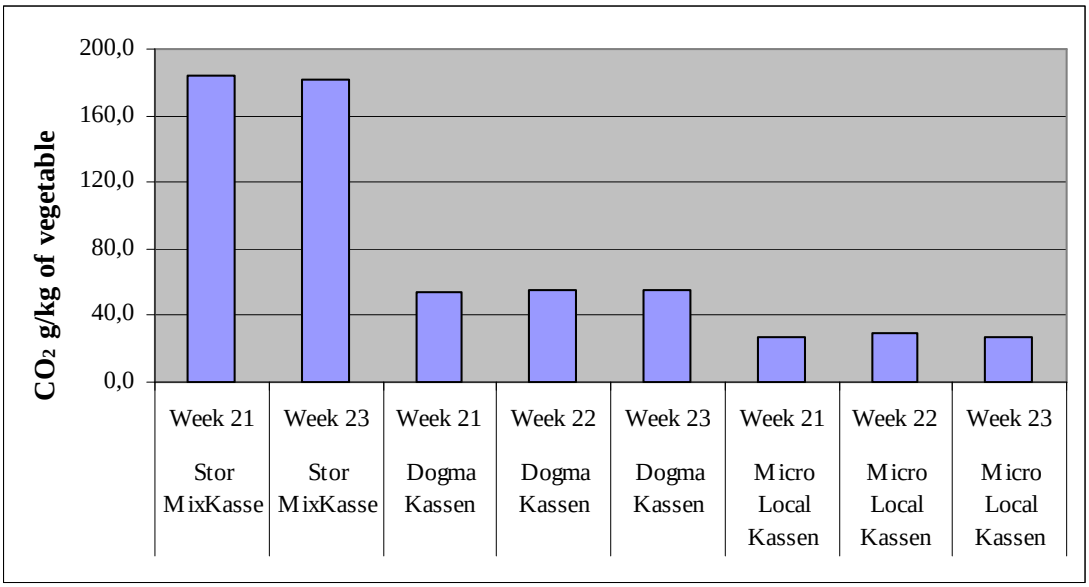

Figure 7: CO_2 emission per kg of vegetables for the sampled boxes

The method used to measure the transport distance only takes into account the distance from the distributor to Aarstiderne. In the case of imported fruits and vegetables, the calculated distance is almost always less then the real distance. This is because wholesaler in foreign countries is often not the same as the producer, thus the product may travel various distances before they reach the wholesaler. Aarstiderne was unable to give the origin of production for the product originating outside of Europe. This problem only occurs with the fruits and vegetables imported to Denmark. For the vegetables grown in Denmark the producer is known and the distances used in calculations better reflect the reality. Overall, these considerations show that these results probably underestimate the energy consumption as well as the CO_2 emission of foreign goods. This would imply an even higher efficiency of the *Dogma Kassen* compared to the *Stor MixKasse*.

These results do not take into account the production of vegetables and therefore it must be remembered that the energy requirement for the production of the various fruits and vegetables differ according to the location in which they are grown. Other studies have shown that there is variation in the energy requirement for crop growth according to climatic condition. Blanke and Burdick (2005) have showed that apples grown in New-Zealand, a good climate for apple growing, required 2,1 MJ/kg compared to the 2,8 MJ/kg required for apples grown in Great-Britain. This factor must be considered when comparing the locally grown product and the imported one by Aarstiderne. Also, the *Stor MixKasse* contains some fruits that are practically impossible to grow locally in Denmark, such as pineapple, orange, lemon or banana. Consequently the *Stor MixKasse* cannot be made with products coming only from Denmark. Another aspect of the locally grown products is that the species requiring warm temperatures, like cucumber and tomato, require a heated greenhouse for their production. The use of such a system requires a lot of energy and it as been demonstrated by Dutilh and Kramer (2000) that it may be more energy demanding to do this than to import the product. However the *Dogma Kassen* is already made up of Danish-produced goods and shortening the supply and distribution chain could

greatly enhance the energy and CO_2 emission balance of this boxes. Moreover, the packaging used in all boxes is responsible for a large part of the energy consumption of the box and consequently any reduction in this aspect would lead to a decrease in negative environmental impacts.

Waste management

Aarstiderne has a clear policy of waste management. Namely, they try to reuse as much as possible and to decrease the total amount of waste. In the Barritskov facilities, where all the boxes are packed, they valorise all perished fruits and vegetables by composting them. They then apply this amendment on their agricultural land. They would eventually like to sell this rich material (A18_Aarstiderne, 2006). This management strategy is environmentally sound because minimal waste is generated and all the organic matter is recycled in a natural way. No information was available concerning the total amount of compost generated per year.

The wooden boxes used to carry the fruit and vegetables are used on average 7 times (A17_Aarstiderne, 2006). They are then burned in the Barritskov central heating system, thereby releasing the energy they contain. This system results in the recuperation of part of the energy used by the box itself. Last year, Aarstiderne used about 170 000 boxes, which represents roughly 20 tonnes of wood. This is a convenient and energy-saving way of recycling material that is otherwise unusable. This system is a component of the energy plan of Aarstiderne (A18_Aarstiderne, 2006). In this plan they monitor the energy consumption and try to increase their on-farm energy efficiency from year to year.

Waste material of plastic and cardboard origin is recycled via the public recycling services (A17_Aarstiderne, 2006). Although this is not considered waste, it still represents an externalisation of internal cost. Data regarding the quantity of material wasted or recycled was unavailable. Consequently it is hard to conclude on the environmental impact of this practice.

Water management is of very modest importance. Aarstiderne does not use much water in their daily activities. They have no water treatment facilities and an employee of the company confirms that the water use was minimal (A17_Aarstiderne, 2006).

Overall, results from the waste management evaluation of Aarstiderne show that there is a concern to keep waste to a minimum. However no data was available to describe the effect of these efforts. The current measures, including the heating system and compost generation, encourage waste recycling and energy efficiency on their various facilities.

Habitat preservation

Aarstiderne has used the *Natura 2000* European program to protect a large part of their land. This program allows them to obtain subsidies for this land for a period of five years. They have made their own nature plan with a KVL master student. This nature plan provides a status of the biodiversity on the farm as well as details

concerning management practices to contribute to its preservation (A17_Aarstiderne, 2006).

The conserved area is located in Barritskov. It covers an area of 700 ha, which is in fact the entirety of the Barritskov farm. Around 450 ha of the land is covered with forest certified by the Forest Stewardship Council (FSC). The FSC label is an international organisation promoting responsible forest management (FSC, 2006). The remaining 250 ha are under permanent or 5 year grass management. The goal is to preserve and maintain the biodiversity of these habitats. They already transformed a significant part of the land to permanent pasture. This is used as a pasture for grazing cattle and they plan to increase the number of animals in the years to come. They have already planted hedgerows on part of the land. They will increase the wood surface by putting wood patches to promote wildlife refuges throughout the field. They also have restored a stream on the largest field. The stream was diverted 200 years ago to power a mill. Now is has been restored in the field and they would like to increase the number of streams in the field and in the forest.

Although they are subsidised for putting forward conservation measures such as the ones described above, they understand that the subsidies will only last 5 years. The Natura 2000 plan helps producers protecting sensitive areas but does not provide permanent support. Thus, their actions can be seen as concrete and planned attempts to increase biodiversity and give importance to environmental concerns.

Ecological consideration in building design

The company has made tangible efforts to build new structures that are environmentally sound. As two examples of this concern, they have built a new barn with a top roof made of black coated steel plates. The building is designed in such a way that the hollow under-ceiling can be used to generate heat from the sunlight that is absorbed by the roof. This system is planned to be used for drying hay, consequently reducing the energy consumption currently needed for that purpose. A second example of their environmental awareness in building design is that they use the wood from their FSC certified forest to build or renovate buildings on site, a practice that ensures that the wood used is not material coming from exploited or un-ecologically managed forest.

Overview of environmental impacts and awareness

As demonstrated, Aarstiderne has important positive and negative impacts on the environment. Because their website states that "[…]ecology goes hand in hand with economy" and "Aarstiderne is a step on the way to the biggest challenge for humanity; reconnecting with the natural world," it is relevant to look at their activities in regard to these assumptions (Aarstiderne, 2006). When looking at the company's internal operations, it is seen that they have various ways of reducing waste and promoting reutilisation which clearly correspond to the concept of linking economy and ecology. This includes the reuse of wooden box as a heat sources, the use of the heated roof for hay drying, the use of wood from their own forest and the preservation of habitats under the Natura 2000 subsidies scheme. These aspects are ecologically sound as well as economically profitable. However when looking at their energy consumption and CO_2 emissions per kilogram of food in each box, it is clear that there are certain negative impacts. Their most popular box scheme requires

around 4,2 MJ of energy per kg of food and it emits more than 180 g of CO2 per kg of food. This is a direct consequence of the high level of transportation involved with importation. In a comparative study done in the Netherlands by Dutilh and Kramer (2000) the average energy requirement to produce, store, package and distribute fruit was between 2 and 5 MJ/kg and for vegetable it was between 1 and 4 MJ/kg. These data are comparable with the energy requirements for the distribution and packaging of the most popular Aarstiderne box, therefore showing that Aarstiderne is not offering a concrete alternative in terms of environmental impacts.

Economic impacts

This section presents the results of the evaluation of economic impacts of the Aarstiderne food chain on its stakeholders. These results are derived from interviews conducted with Aarstiderne suppliers, customers and employees.

When answering the question "Were any changes on your farm driven by your business relation with Aarstiderne?" (see interview questions in appendix D and E), all of the farmers interviewed raised very similar issues. These answers can be related to the structure of organic agriculture in Denmark and can be divided in three categories: specialisation, security and concentration. The costs and benefits of this food chain for the producers and the consumers is also discussed. Finally, the economic pressure on the producers participating in this marketing channel is evaluated.

Impact on the structure of organic agriculture

Specialisation

The Aarstiderne box scheme is currently being supplied by few, specialized growers. Many of Aarstiderne's current and former suppliers are or have been delivering to supermarkets in addition to Aarstiderne. For these, making business with Aarstiderne did not change their production and management practices very much. They mostly have a quite specialized production (3 to 6 different vegetable crops) and deliver only first quality products. One supplier formerly sold his production to the local market and had a high variety of vegetables on his farm at that time. For him, making business with Aarstiderne changed his production to a large extent, as he is now growing a limited number of vegetables that were identified by Aarstiderne as things they were not interested in growing themselves. This farmer qualified his production as more "industrial" than before and saw this change as positive overall, because it was simpler for him to manage and market (A03_producer, 2006). Another supplier said that his production choices were also driven by what Aarstiderne needs and thus his production has been narrowed down to few crops from one plant family (A02_producer, 2006). This phenomenon could be seen as an example of farm specialisation and as a type of loss of control over production decisions from the perspective of the farmers.

Security

Many farmers interviewed felt, to a certain extent, insecure about their future as Aarstiderne's suppliers and also as vegetable producers. One of the former suppliers interviewed stopped producing vegetables after his relationship to Aarstiderne ended (A06_producer, 2006). Another said: "I am not going to invest a lot of money in anything because you don't know what is going to happen next year" (A03_producer, 2006). From the beginning of the company, the number of Danish suppliers of vegetables was reduced from more than 50 to less than 10. Some of the remaining Danish suppliers produce vegetables that can not be easily grown on the Billeslund farm, because of the soil type or other environmental reasons

(A16_Aarstiderne, 2006). According to the company's chair, the remaining Danish suppliers are dedicated, produce high quality and specialty vegetables and deliver most, if not all, of their production to Aarstiderne. This last characteristic is based on the fact that Aarstiderne does not want to deliver the same food as can be obtained in supermarkets and therefore does not want its suppliers to deliver both to Aarstiderne and supermarkets (A14_Aarstiderne, 2006). On the other hand, as the company continues to reduce the number of Danish suppliers, the producers delivering all of their production to Aarstiderne now feel that this situation is too risky and are looking for other distribution channels, including supermarkets (A03_producer, 2006).

Concentration

One of the goals of the company chair is to increase the production on Aarstiderne's own farms and eventually be self-sufficient in terms of Danish vegetables (A14_Aarstiderne, 2006). Doing so would imply the vertical integration of a large part of their activities. At some point during the interviews, it was brought up that the reason for increasing the production on Billeslund farm was linked to quality issues with the Danish suppliers (A18_Aarstiderne, 2006). However, Aarstiderne began to increase their own production when the consumer base had already undergone substantial increase and had begun to stabilize. In 2006, the consumer base is expected to increase by around 10% (A15_Aarstiderne, 2006).

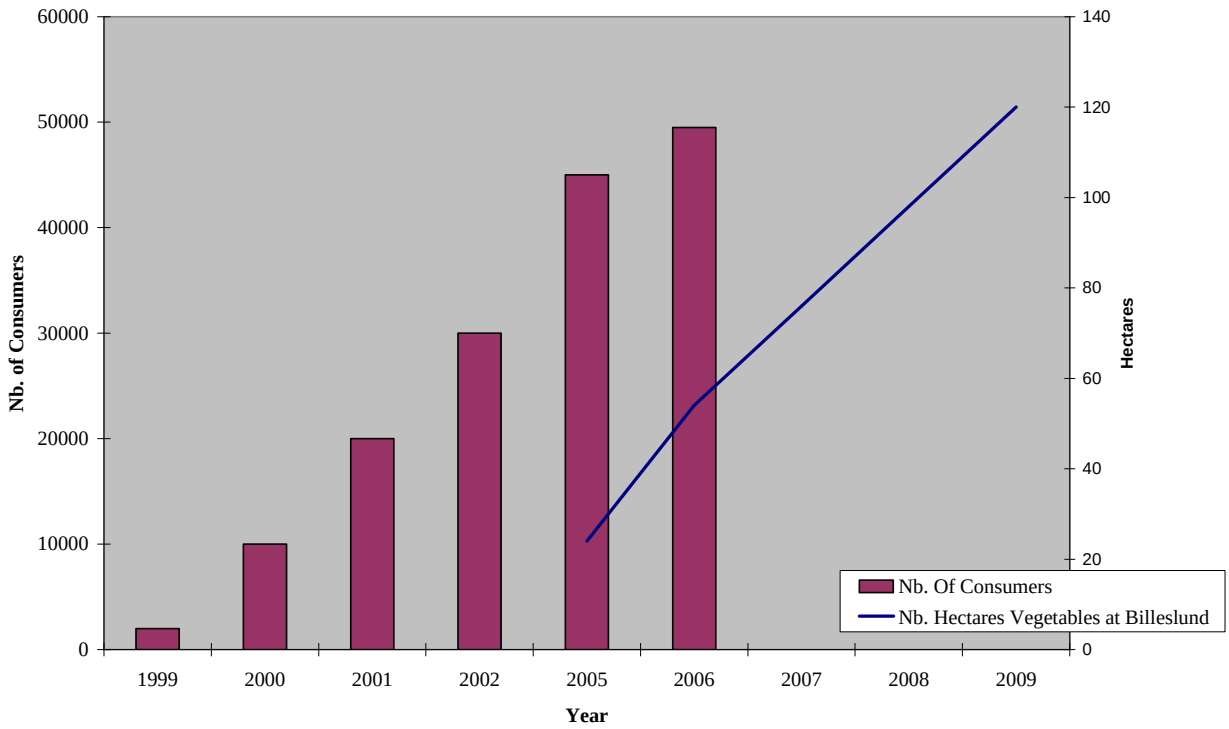

Figure 8: Evolution of Aarstiderne's consumer base and number of hectares grown in vegetables at Billeslund farm

In the future, it is expected to keep increasing, but the expected growth rate is much lower than in the past (A14_Aarstiderne, 2006). In the years preceding this vegetable production increase, large growth was recorded in the number of consumers (figure

8). Therefore, it is not obvious that delivering high quality, and therefore reaching and keeping customers, was a significant problem at that time. Therefore, the reason of self-sufficiency seems to be a more logical explanation of the increase in vegetable production increase at Billeslund.

During the interviews, an important discrepancy between initial and current producers' perceptions of the company was noted. It is clear that many producers saw Aarstiderne as a retailing company, a company that would allow small Danish organic vegetable growers to stay in business, develop their farms, and efficiently and easily market their production (A03_producer, 2006). On their website, Aarstiderne also affirms that the company "provides a sales channel for organic farmers" (Aarstiderne, 2006). The growers are afraid this is no longer the case. They feel that they supported Aarstiderne at the beginning and now they feel betrayed by the production increase at Billeslund (A01_producer, 2006). Some go as far as to say that this practice is driving many small organic vegetable growers out of business (A03_producer, 2006 and A06_producer, 2006).

> *"The fact is that more and more farmers have closed down, who before were selling to Aarstiderne. […] We've really liked this company and now, it looks like they want to make it themselves, which means that they don't need us anymore. It's like we were OK in the beginning, for the start and then, now that they can afford it, then they do it themselves*" (A03_producer, 2006).

The fact that Aarstiderne is increasing their own production of vegetables and ending their relations with many suppliers in Denmark is undoubtedly concentrating the organic vegetable production in the country. In the future, Aarstiderne is planning to increase its vegetable production area from 54 ha in 2006 to 120 ha in 2009 (A18_Aarstiderne, 2006).

This aim of the company to produce everything themselves is also perceived by farmers as a bad decision because of the level of risk it represents. For them, if Aarstiderne produces most of what they sell on their own farm, they lose their network. In those circumstances, any reduction in yield (because of pests, diseases, etc.) would result in more imports from foreign countries because nobody else in Denmark would be able to compensate for those losses. This view was, to some extent, shared by the head of the purchasing department at Aarstiderne: "In the past where we had four different growers in lettuces, maybe one of them had a problem in one week and then the three other producers could fulfil the volume" (A17_Aarstiderne, 2006). For the purchaser, self-production is a risk, but it is a challenge that he is ready to meet.

Regarding the choice of the producers abroad, wholesalers and producers selected have to deal only with organic foodstuff and to deliver high quality. Producers abroad do not have to comply with the Danish organic standards but to the European organic standards. Even if purchasing of imports is made on the open market, most of the producers originate are known and many of them were visited by the purchaser

within the company. On the other hand, the detailed mode of production and the working conditions are not considered when selecting suppliers abroad (A16_Aarstiderne, 2006).

Costs and benefits

Producers

Based on farmers' interviews, making business with Aarstiderne is generally seen as a positive thing. Most farmers said they received a good price for what they produce. Moreover, they considered that they have a very good relation with the company; compared with supermarkets. Aarstiderne was considered as more polite, more open to discussion, respectful of the farmers' work and products and easier to work with in terms of logistics. For example, Aarstiderne, as opposed to supermarkets, takes care of the transport from the farm to the warehouse, and prices and quantities are, for the most part, decided in the fall. Therefore, there is less paperwork for the farmers to do, packaging and washing is less demanding and the payment is received within 8 days after delivery. This is in contrast to the 45 day credit that is habitually demanded by supermarkets. Overall, the farmers stated that they received a lower price through the supermarkets but that their revenues were equal or higher and that the time spent on transactions and agreements lowered. Only one former supplier of Aarstiderne was very upset about how his relationship with Aarstiderne ended; he thought that agreements had not been respected and said that the people he was dealing with in the company kept changing from year to year.

Consumers

For the consumers, the costs and benefits are more difficult to evaluate. If only price comparisons between the box and similar items bought during the same week in the shops are considered, it is seen that the *Dogma Kassen* price (185 DKK) was advantageous for the consumer on week 21 (table 7). This is true even though two items were not found in the shops and therefore not added to the compiled 'supermarket price.' The same comparison for week 23 resulted in no clear economic advantage in buying the *Dogma Kassen*; the 'supermarket price' is 31,9 DKK lower than the box price but three items were not found (table 8). For the *Stor MixKasse*, there was possibly no economic advantage in buying the box on week 21 as two items were not found and, without those, the prices in the shops are 27 DKK lower than the box price (213 DKK) (table 9). The same thing applies for the week 23, when the 'supermarket price' is 28,5 DKK lower than the box price while two items were not found in shops (table 10). On the other hand, it must be taken into account that these are data for only two weeks, and since the box price is fixed for the customers, Aarstiderne could potentially lose money on one box in a given week and make a large profit on it in another week (A17_Aarstiderne, 2006). Therefore, the economic benefit of a consumer in buying the boxes is likely to change from week to week.

Table 7: Price comparisons between the Dogma Kassen and similar items: week 21

Product	Origin (Box)	Origin (Stores)	Store	Price (DKK)
Week 21				
Lettuce	DK	DK	Super Brugsen	17,0
radish	DK			0
Jerusalem Artichoke	DK	DK	Irma	59,0
Rhubarb	DK	DK	Irma	19,8
Cucumber	DK	DK	Irma	15,0
Tomato	DK	Holland	Super Brugsen	25,7
Chilipepper	DK			0
Cauliflower	DK	France	Super Brugsen	20,0
Potato	DK	Italie	Super Brugsen	26,7
Mushroom	DK	Italy	Purefood	9,9
			Total (DKK)	193,0
			Saved (Stores vs Box)	-8,0

Table 8: Price comparisons between the Dogma Kassen and similar items: week 23

Product	Origin (Box)	Origin (Stores)	Store	Price (DKK)
Week 23				
Potatoes	DK	Italy	Super Brugsen	26,6
Lettuce	DK	DK	Super Brugsen	42,3
Dill	DK			0,0
Eggplant	DK			0,0
Chilipepper	DK			0,0
Zucchini	DK	Italy	Pure Food	12,3
Tomato	DK	DK	Super Brugsen	25,8
Cucumber	DK	DK	Super Brugsen	11,6
Rhubarb	DK	DK	Irma	24,8
Pepper	DK	Italy	Super Brugsen	9,7
			Total (DKK)	153,1
			Saved (Stores vs Box)	31,9

Table 9: Price comparisions between the Stor MixKasse and similar items: week 21

Product	Origin (Box)	Origin (Store)	Store	Price (DKK)
Week 21				
Apple	Argentina	Argentina	Netto	11,6
Banana	Dominican Republic	Dominican Republic	Irma	18,3
Cabbage	Italy	Holland	Irma	19,8
Carrot	Spain	Israel	Irma	12,7
Cucumber	DK	DK	Irma	15,0
Eggplant	Holland			0
Lemon	Italy	Spain	Irma	6,6
Lettuce	DK	DK	Super Brugsen	17,0
Mushroom	DK	Holland	Purefood	14,1
Pineaple	Costa Rica	Uganda	Purefood	49,0
Radish	DK			0
Tomato	Spain	Holland	Super Brugsen	22,0
			Total (DKK)	186,0
			Saved (Stores vs Box)	27,0

Table 10: Price comparisons between the Stor MixKasse and similar items: week 23

Product	Origin (Box)	Origin (Stores)	Store	Price (DKK)
Week 23				
Lettuce	DK	DK	Super Brugsen	36,4
Carrot	Spain	Italy	Super Brugsen	12,8
Cucumber	DK	DK	Irma	17,1
Rhubarb	DK	DK	Irma	27,6
Tomatoes	Italy	DK	Super Brugsen	22,5
Dill	DK			0,0
Watermelon	Spain			0,0
Apples	Argentina	Argentina	Super Brugsen	29,6
Oranges	Egypt	Spain	Super Brugsen	14,3
Cherry tomatoes	DK	DK	Super Brugsen	10,1
Fennel	Italy	Italy	Irma	14,1
			Total (DKK)	184,5
			Saved (Stores vs Box)	28,5

All consumers interviewed did not believe that they had an economic advantage in buying the box and some of them thought it was more expensive than buying the products elsewhere (A10_consumer, 2006). Generally, however, it was not an important criterion considered when ordering the box. From the point of view of the employee responsible for consumer research at Aarstiderne, the boxes can compete with supermarkets' prices if the customers give a value of 10 to 20 DKK for the delivery and the recipes. He also pointed out other benefits of the boxes to the consumers, such as a greater variety than in the other Danish shops (A15_Aarstiderne, 2006). From the consumers' points of view, other benefits included time savings, inspiration from the recipes, exposure to new vegetables, an

easy access to organic food and trust in the company. Because shopping often induces more spending than needed, it was also considered as a way to save money by one of the consumer interviewed (A09_consumer, 2006). Disadvantages related to their subscription to Aarstiderne included not being able to choose every item, spending more time on cooking of unknown vegetables, quality issues such as short shelf-life, disproportionate quantities of some vegetables and variation between the content of the box and the list available on the website.

Economic pressure on the farmers

The relationship between the producers and the company seems to have changed over time. Producers said that in the beginning they would receive more than asked for a given vegetable because the company thereby was ensured its suppliers for the following years. This seems to have changed over time, even if the farmers still feel they receive a fair price. They also say that they are beginning to feel the competition from imported products and they feel that Aarstiderne also feels a price pressure from consumers.

As stated before, farmers perceived that they were receiving a fair price for their products. In the company's perspective, Aarstiderne does not have to compete with the supermarkets for customers: "Of course we are selling the same products because the supermarkets are selling carrots, potatoes, onions and so on but we are more selling stories, we have home delivery […]"(A17_Aarstiderne, 2006). They also feel they do not have to compete for suppliers: "We don't have to. Because normally we are quite nice and polite to work with, so the suppliers, they prefer us first." (A17_Aarstiderne, 2006). So, it is possible to say that Aarstiderne does not put the same economic pressures on growers as do conventional food chains.

Even if some farmers said they feel threatened to some extent by the availability and low price of imported products, Aarstiderne's purchaser was firm about the fact that no imported product would be substituted to available Danish-grown vegetables (A17_Aarstiderne, 2006). To explain the fact that, for the same week, tomatoes in the *Dogma Kassen* are grown in Denmark and the ones in the *Stor MixKasse* from Spain, the chair of the company, Thomas Harttung, said that the Danish producers do not have the volume necessary to accommodate all the boxes. Harttung explained that "The *Dogma Kassen* is like a development tool internally to say: "OK, if we can grow a little bit of that, couldn't we not grow a little more of that" and thereby increase our own production […]" (A14_Aarstiderne, 2006).

An important aspect of the business relation for the producers is the risk sharing between the Danish producers and the company. As agreements are made in the fall for the coming season, the producers have a certain level of security of their associated revenues. Also, as opposed to supermarkets, Aarstiderne will do all they can to sell all the vegetables they have made agreements on. In this way, they share the risk with the farmers (A17_Aarstiderne, 2006). This is made possible by the fact that the company decides what is distributed in the box weekly and, in that respect, the consumers also share the risk with the producers. Also, the box scheme model allows some flexibility in the supply that is appreciated by the farmers and the purchaser. For example, this concept allows the purchaser and the suppliers to deal more easily with the impacts of the weather on the availability of the products

(A17_Aarstiderne, 2006). Another example of flexibility is the possibility for the producers to substitute two smaller items for one of a regular size, while keeping the quality standards high and maintaining set agreements (A03_producer, 2006).

The bargaining power and the freedom granted by the box concept are used to buy cheap products on the open market, for all imported products. While agreements exist about the quantity and price of supplied products by the Danish growers, the imported items are bought on the open market approximately one week before delivery (A17_Aarstiderne, 2006). Also, as these items are bought through wholesalers, the company does not know how much of their price gets to the producers. It was therefore impossible to evaluate the distribution of money through the food chain. The portion of the product final value that is taken by the company can be approximated by knowing that the turnover in 2005 was 18,5 million euros. From this amount, around 50% was spent on the purchase of food (A17_Aarstiderne, 2006). Based on this, it can be concluded that half of the money paid by the customers is used within Aarstiderne for retailing and related activities, while the other half is spent on transport, production and importation of food. Overall, some negative economic impacts of Aarstiderne food chain were associated with the structure of organic agriculture in the Danish context. On the other hand, the economic situation of the farmers making business with Aarstiderne seemed satisfactory and their concerns were related to trust and security issues.

Social impacts

In this section, the results of the social impact evaluation are presented. The three contexts presented in the theory section are followed here. Therefore, the perception of local from the perspectives of customers, producers and the company is presented first. This is followed by a discussion of the social integration of the Aarstiderne food chain. Lastly, the alternativeness of this chain is characterised in reference to the continuum of choice to change.

Local typology

In this section we will present the results concerning perceptions and actions relating to the concept of 'local'. The perceptions of consumers and producers as well as the relevance of company policies and practices on these perceptions will be evaluated. Lastly, an overall picture of spatial integration will be determined.

Customers' perceptions of local

In total, 5 customers were interviewed, representing a range of Aarstiderne customers but together painting a relatively uniform picture of the consumer's view of the company. The interviews customers presented a fluid and relative vision of what local meant to them. Most began by stating that local was a region near to where they lived, such as Northern Zealand, but quickly expanded their definition to all of Denmark, and sometimes even all of Europe (A07_consumer, 2006; A10_consumer, 2006). This flexible definition depended for most of the customers, on the specific food item. For example, one customer said that for certain things Denmark was local and for other things nearby European countries was local (A09_consumer, 2006). Thus, it was not simply a distance factor that determined localness for the customers. Rather, it was distance combined with a qualification of type of fruit or vegetable that constituted the boundaries of local.

Perhaps more importantly, purchasing local food was not a stated priority for any of the customers. One customer, who happened to be the only customer interviewed who routinely purchased the *Dogma Kassen*, specifically said that she was more interested in the quality of the product than whether it was local or not (A07_consumer, 2006). In addition, this customer was purchasing the *Dogma Kassen* because it was "Danish" not because it was local, further connoting a quality characteristic on local that is not spatially dependent. Another customer said that local was not important to him as long as the product was "fair trade" (A10_consumer, 2006). In addition, none of the customers mentioned localness as a reason why they purchase from Aarstiderne. Together, these perceptions showed that spatial integration forms part of a general definition of localness without being concrete factors involved in customers' interactions with Aarstiderne.

Producers' perceptions of local

The producers interviewed presented a somewhat paradoxical definition of local. Most of the producers had a notion of local that was spatially very close to their farm. Their responses included descriptions such as 15km away, nearby cities, or on the producer's own island (A03_producer, 2006; A05_producer, 2006; A01_producer, 2006). However, they all quickly qualified their response by adding

their definition of their "local market" which was always Denmark as a whole. One producer, for example, stated that 15km was local for purchasing, but all of Denmark was local for selling (A03_producer, 2006). This evidences a clear distinction between what is considered 'local food' and 'local market.'

It is important to note that all of these perceptions are based on Danish producers, who were, or had been, selling their products only within Denmark. Therefore, they are by default, selling on what they described as their 'local market.' Indeed, the description of Denmark as the 'local market' may be more a reflection of producers' actions, rather than a true definition of what they feel is local. Though it was not specifically discussed, there was a feeling among the producers that they would like to be able to sell to their local area, but this was not regarded as a realistic option, given the current construct of the Danish organic market.

Aarstiderne practices and policies

An analysis of Aarstiderne's policies and practices reveals a mixed picture of spatial integration. To begin with, the company's mission statement makes a reference to distance without specifying whether that is a spatial or social term.

> *"Aarstiderne recreates the **close** connection between the cultivation of the soil and joy in meals that are full of good raw materials, health, taste and **presence.**"* (Aarstiderne 2006, emphasis is added)

In addition, the company founder and chair, Thomas Harttung has strong ideals of spatial locality, in which he envisions for the future a regionalisation of food distribution, which provide food to a very limited area (A14_Aarstiderne, 2006).

However, based upon the results of the environmental section, it is seen that Aarstiderne is actively engaged in spatially distant sourcing of products. Moreover, the person in charge of the purchasing department within the company made it clear that the selection of suppliers abroad is not affected by their distance from Denmark (A17_Aarstiderne, 2006). However, the company does offer a *Dogma Kassen*, in which all products are sourced from within Denmark. At the moment, this is the most place-specific or spatially localized product that the company offers. Thus, the company offers the consumer the choice of spatially local, which fulfils the consumer's notion of local if they feel that all of Denmark is local. However, the packing and distributing of the *Dogma Kassen* is like any other, thus products sourced from a farmer on Zealand are nevertheless sent to Barritskov for packing before passing through the Bjaeverskov terminal on their way to a customer in the Copenhagen area. Thus, for the customer who said she lived near an organic carrot farmer, who happens to be a supplier for Aarstiderne, only her definition of 'Denmark as local' was being fulfilled, even though she was receiving products from a farm less than 5 km from her residence (A07_consumer, 2006). This exemplifies the fact that the company is providing 'local' produce that is nevertheless not spatially integrated.

In terms of fulfilling producers' notions of local, the company again provides a mixed result. The company is providing a primarily Danish market for its producers

(except for the recent expansion to the Stockholm area). This is in line with the producers' definition of local market, but far from their definition of local in a more fundamental sense. The producers do not feel they are selling to their local area by selling through Aarstiderne. They are aware that there produce goes wherever in Denmark that Aarstiderne has customers, thus for the majority, to the Copenhagen area.

Overall, it is seen that Aarstiderne is providing only a limited version of local for both consumers and producers. The company chair sees the *Dogma Kassen* as allowing consumers to go as far as they want with the concept of localness, by providing them with the choice of Danish produced goods (A14_Aarstiderne, 2006). But instead of being fundamentally spatially local for either consumers or producers, it is perceived more as a label of the quality 'Danish produced.' This is more a reflection of defensive localism, in which the motive for buying local rests fundamentally on protectionism of socially defined relations, such as political boundaries (Winter, 2003; Hinrichs, 2003). It cannot be determined by this study whether customers would like to take local further than this, so to speak, however it is clear that the company is providing a product, even in the *Dogma Kassen*, that is relatively lacking in spatial integration.

Taken together, the perceptions of customers, producers and the company create a definition of 'local' that is both coherent and paradoxical. All actors involved demonstrated concepts of local that were spatially defined, however their decisions and actions were directed by definitions of local that were more quality defined or market driven. This clearly shows that the spatial concept of local was not as important as other factors within the relationships that Aarstiderne fosters throughout the food chain.

Social integration

Within this section we will present the results of the impacts concerning social integration. This will be evaluated from the perspective of consumers and other members of the general public, from the perspective of producers, and from the perspective of practices and policies of the company. Specifically, we will evaluate the type and level of information transfer through the food chain, the basis of trust between actors, and the degree of vertical and horizontal networking. Together, this will help us to evaluate the level of social integration promoted by the company, specifically focusing on the producer-consumer link. To better clarify the patterns of communication within the company figure 9 has been developed. In this figure, two types of communication have been presented. The first type, shown in a purple dashed line, represents information concerning consumer desires and wishes. The second type, shown in an orange solid line, represents the "product story" that Aarstiderne passes to its customers (A15_Aarstiderne, 2006). Some examples of the specific information contained within these two types of communication are given in table 11. The thin orange line from 'Producers in Denmark' to 'Website and newsletter' is intended to indicate a weaker communication pathway. It is important to note that these pathways represent information transfer, not product transfer.

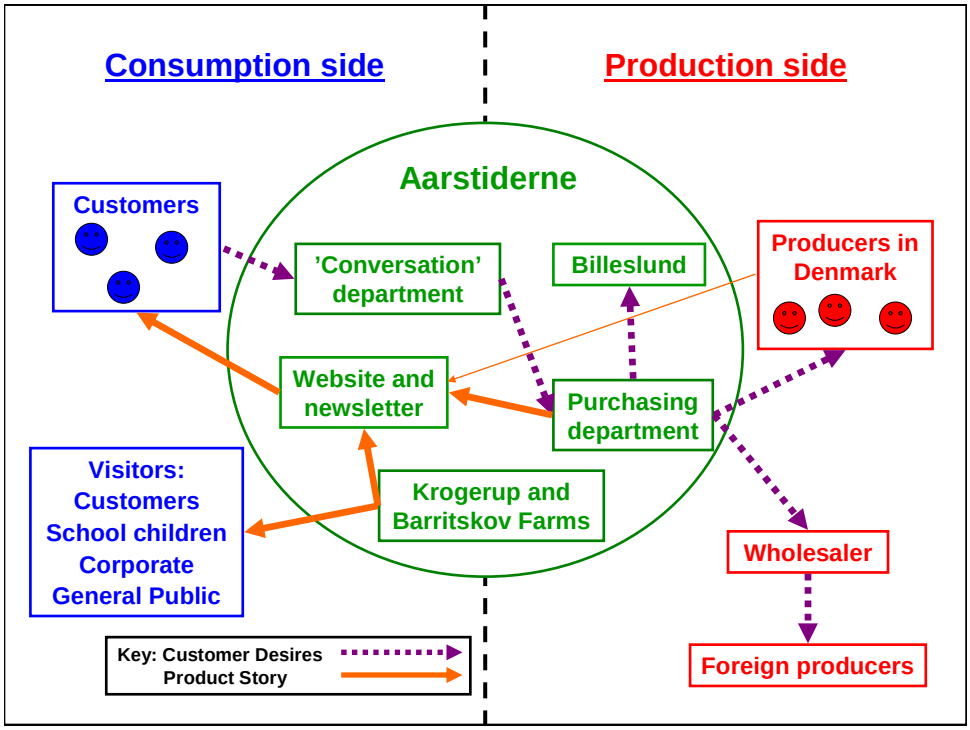

Figure 9: Diagram of communication pathways within Aarstiderne food chain

Table 11: Examples of information within two types of communication pathways

Customer desires	Product story
Food quality Produce freshness Quantity of each item Size of box Price	Product origin Producer information Farm information Recipes

Information transfer

From the perspective of the consumer and the general public, Aarstiderne is foremost a well known name in Denmark. All customers interviewed, when asked how they had first heard of Aarstiderne, gave answers that showed the large media and cultural presence the company has. One consumer went so far as to say that Aarstiderne is a brand name that everyone knows (A11_consumer, 2006). The company has made it an explicit goal to become a well known name in Denmark, through the internet as well as through other forms of non-traditional advertising, such as events and media coverage (Aarstiderne, 2006; A15_Aarstiderne, 2006). At the same time, the company emphasizes that it does not have a budget for traditional marketing and wishes instead to promote word of mouth growth of the company (Aarstiderne, 2006; A14_Aarstiderne, 2006). Thus, it is immediately clear that the information transfer between Aarstiderne and consumers is intended not only for clients, but for the general public as well.

Next, it is important to investigate the different forms that this information transfer takes. First of all, almost all of the customers purchase their boxes via the online interface on the company's website (A15_Aarstiderne, 2006). On the website, the

consumers can see what will be placed in the boxes about five days ahead of time. They are able to modify their order (including the type and number of boxes they wish to order) up to two days ahead of their scheduled delivery. This sends direct and immediate information to the company concerning customers' desires and purchasing patterns (A15_Aarstiderne, 2006). Importantly, this information does not return to the website or newsletter, rather it is processed by the company's conversation department, which in turns passes these requests upstream to the purchasing department, who in turn passes it towards the producers.

In addition, consumers receive information on the website in terms of product origin. For some producers, there are links to short biographies with details about the producer and short quotes concerning their farming. These bios contain information allowing the consumer to directly contact the producer, however at least one producer mentioned that this site was out of date by at least two years (A01_producer, 2006). This link is shown as tentative on figure 9 because the information contained within the website and newsletter is not actually direct from the producer, rather it is highly mediated by the company itself. A new addition to the website is the web forum, in which customers are encouraged to share their experiences online. This forum is open to the public and the company makes a point of stating that it is read by company employees (Aarstiderne, 2006). None of the customers interviewed had participated in this forum, though one had occasionally read the posted comments (A07_consumer, 2006). Ostensibly, producers can also participate in this web forum; however it is unclear to what extent they do (especially since some of the producers interviewed did not regularly use the internet). This forum, if used, would provide a more horizontal and direct connection between customers. Overall, the primary functioning of the website is to provide a limited two way information transfer; customers send information to the company primarily in the form of their weekly order and the company provides some product information.

Secondly, all customers receive a newsletter in their box each week. These newsletters are primarily focused upon recipes that can be used in conjunction with the food provided in the boxes. These newsletters also provide the producer name and country origin of each product and usually contain a short letter or story about some aspect of the company. This can be a short story of a particular product, a spotlight on a producer or a letter from someone within the company. All customers interviewed mentioned the newsletter, specifically in relationship to the recipes provided.

Thirdly, the 'conversation' department within the company can be seen as another avenue of information transfer. Communication within this channel is primarily unidirectional. The vast majority of information is passing from the consumer to the company and up the chain to the purchaser and lastly to the producers. This is done in two ways. Firstly, the company carries out numerous customer surveys, mostly through the internet. These are done with the specific intent of gather information to provide a better product, thereby maintaining customers and gain new ones (A15_Aarstiderne, 2006). Secondly, customers can call or email (and many do) and receive information from the company. The company emphasize that these calls and emails should be seen as conversations, which connotes a give and take between

actors. However, as indicated by the singular direction of the arrow in figure 9, minimal information is passed from company to consumer during these exchanges.

Lastly, a significant number of visitors come to the Barritskov and Krogerup farms. These visitors come in many different capacities: box-scheme customers, members of corporations for business retreats, farmers interested in the working of the nature plan, general public who come to the restaurant for catered events, students, etc. Aarstiderne promotes a multi-functional use of these farms and encourages visitors through organizing these many events (A18_Aarstiderne, 2006; A13_Aarstiderne, 2006). In this setting there is the potential for a considerable transfer of information. In an interview with the restaurant and catering manager, it was clear that the emphasis was placed on enjoyment of the place, with some attention to information regarding food preparation (A13_Aarstiderne, 2006). In addition, the company has set up "street kitchens" in Copenhagen elsewhere, using their mobile kitchen (Aarstiderne, 2006). These events therefore provide a modest venue for three way communication between the company, people working on the farms themselves, and the general public.

Trust

Within the food chain network created by Aarstiderne, there are examples of limited trust from both the perspective of consumer and the perspective of producer. From the perspective of the consumer, there is foremost a trust in quality characteristics of the product. Every customer interviewed stated quality as one of the important reasons for purchasing through Aarstiderne. Though the specific meaning of quality differed between the customers, most were adamant about the fact that Aarstiderne provided a quality that couldn't be found elsewhere. Importantly, this level of quality formed the reason for continued patronage of the company, for continued trust. It was also noted that this trust in quality is placed in Aarstiderne, rather than in the producers themselves. One customer, when asked about their relationship to the farmers, said that he trusted the farmers to not harm the earth. However, this belief was founded in the company's use of only organic, not upon any knowledge of the producers or specific production methods (A10_consumer, 2006). This shows a trust that is founded upon criteria of quality and is centered in the brand of Aarstiderne, not further up in the food chain.

From the producers' side, it was clear that any relationships of trust were only formed with the company itself, and did not extend beyond to the consumers themselves. Most of the current producers did say that they trusted the company and had a good relationship with them. One producer liked the fact that the Aarstiderne representative always wished him a good day, which a supermarket representative would never have done (A03_producer, 2006). On the other hand, when asked about future security with the company, most of the producers did not express trust that their relationship to the company would remain the same. Former producers were particularly vehement in their lack of trust of the company. One former farmer was particularly angry with the company's lack of internal consistency; when he made a deal with one representative it was not upheld by another (A06_producer, 2006).

Beyond this, which may or may not be due to company decisions, it is most important to note that the producers have no opportunity to exchange in trusting

relationships with their consumers. There is no opportunity to brand or label the produce that is distributed through Aarstiderne, thus the consumer may or may not make a connection with the specific producer. Some customers noted that they do begin to recognize names of producers from reading the newsletter; however they had no feeling of connection to the producer beyond this (A07_consumer, 2006). One producer said that he had received one call directly from a consumer concerning a complaint about his lettuce. However, he was unsure if the consumer had actually received his lettuce, since there were other suppliers of lettuce to the box that week and the producers were listed collectively on the newsletter (A01_producer, 2006). Most producers and all customers decisively said, when asked, that Aarstiderne had in no way changed their relationship to one another. Thus, overall, any relationships of trust that may be instigated by Aarstiderne are centrally channeled through the company, and do not extend from one side of the food chain to the other.

Networking

The evidence for horizontal networking between actors is based on interviews, and therefore is admittedly minimal in scope and scale. From the producer interviews, many farmers engaged in communication with other organic farmers, which they attributed to the fact that the organic community within Denmark is limited (A01_producer, 2006; A03_producer, 2006). However, these networks did not stem from any connection to Aarstiderne, and thus cannot be linked to this particular food supply chain. Customers were specifically asked whether their interaction with Aarstiderne had changed anything about their social life. Though one customer mentioned that she had been responsible for introducing new foods to some of her friends (A07_consumer, 2006), none of the customers noted any new contacts formed specifically through Aarstiderne. One customer living in a community in which food and meals were shared ordered from Aarstiderne as a supplement for his own family, not as part of the group food. For group food, the community purchased directly from wholesalers in the region (A10_consumer, 2006).

The company does provide a few venues in which consumers may have an opportunity to network. They offer customer dinners and similar events from time to time, however these are not widespread nor institutionalized within the consumer community. It is unclear how much this contributes to networking between customers and the company or between customers. However, as already stated, the multi-functional purposes of the two open farms, Barritskov and Krogerup do provide a place for networking to potentially occur, and this is clearly a stated goal of the company for these farms.

Producer-Consumer link

Based on the communication, trust and networking between actors within the Aarstiderne food supply chain; we can now investigate the nature of the link between consumer and producer. The website touts this attribute of their distribution system with the following quote:

> *"Aarstiderne has re-established the communication between those who produce the food and those who consume it – a farmer to citizen communication – soil to plate - in a contemporary way."* (Aarstiderne, 2006)

However, it has been seen that the primary methods of communication throughout this food network are not face-to-face. The main methods include virtual communication via the website, telephone communication and newsletter communication. These methods may or may not achieve the producer-consumer link as it is envisioned by the preceding quote. More importantly, all links between producer and consumer must pass through the company framework, creating a centralized and vertical communication chain, as opposed to a more network-based or horizontal framework (see figure 9). For example, there are numerous outreach activities taking place at the company's demonstration farms, with tens of thousands of individuals participating, however there is no encouragement or publicity for any activities that may take place on any of the Danish suppliers' farms (A13_Aarstiderne, 2006; A18_Aarstiderne, 2006). This shows that the emphasis has been on connecting the consumer to the Aarstiderne "story" as opposed to directly to the producer (A14_Aarstiderne, 2006). Outside of the link that the customers make directly to the company, which does grow a portion of its produce, it seems unclear that Aarstiderne succeeds in creating a "direct" link between producer and consumer.

Alternativeness: Choice or change

In this section, the perceptions of actors related to the type of alternative provided by Aarstiderne will be evaluated. Because the focus of the economic analysis was placed on the changes to production experienced by producers, we will not examine this here. Instead, we will focus on the type of alternative experienced by the consumer and the level of change promoted by the company. This will be guided by the continuum of choice to change provided in figure 3, within the Social Impact section of the Theory chapter.

<u>Consumer perceptions</u>

> *"It is not essential to me that I am having a box from Aarstiderne and I don't feel any responsibility to the firm or anything. I am very much a consumer, who just subscribes when I feel like it. … It is not a religion, it is handy"* (A11_consumer, 2006)

First of all, the flexibility of the box scheme was mentioned by several customers as a defining attribute of business with Aarstiderne. Many of the customers interviewed changed boxes from time to time, and some used the online grocery store to create their own personal orders of goods not included in the boxes (A07_consumer, 2006). Beyond this, many of the customers purchased from Aarstiderne because of convenience. Together, this emphasis on flexibility, choice and convenience reflect a general feeling that, as customers of Aarstiderne, they are primarily consumers, in the way that they would be in any other store.

As noted in the quote preceding this section, responsibility towards the company was very minimal. None of the interviewed customers felt like a 'member' of the company, rather they felt they were purchasing a product from the company. The company member in charge of consumer research emphasized the great freedom offered by the box scheme, saying that consumers frequently ended and restarted their subscription, due to changing personal circumstances (A15_Aarstiderne, 2006). The only risk the consumer felt they had to take was the 'risk' of having potentially

unknown or unwanted vegetables in the box. However, this was avoided by one consumer, who would purposefully avoid ordering a fruit box if it contained mangoes (A07_consumer, 2006). Again, because of the flexibility of ordering, the risks involved on the part of the consumer were minimal.

In terms of change, there seemed to be little change on the part of customers due to their engagement with Aarstiderne. When asked about what aspects of their lives had changed due to their box subscription, the majority of customers noted only small changes, such as trying new recipes. Some customers did mention that they felt they were eating more vegetables because they wanted to eat everything in the box (A11_consumer, 2006; A10_consumer, 2006). All customers regularly purchased organic produce outside of their box subscription, but this was something that was done before they decided to receive boxes. The comment that the box was a "supplement to my normal buying" illustrated the general feeling that purchasing through Aarstiderne did not require a large change in lifestyle (A10_consumer, 2006). Overall, from the perspective of a customer of Aarstiderne, the emphasis is firmly placed on the diversity of choice, rather than on fundamental change.

Aarstiderne practices and policies

The policies and practices of the company follow the same theme as evidenced by customers' interviews. Overtime, the responsibility of the customer within the company has decreased, while the choices available to the customer have increased. The following quote, taken from the website, is unfortunately woefully out of date.

> *"Right from the beginning - the customers have prepaid the boxes. In the beginning they prepaid three months - now they are only prepaying one month. Without this it wouldn't have been possible to finance the growth of the company. Also the engagement between customer and company has had a longer term character in the form of subscription to a box, where the content is composed by Aarstiderne. This makes planning both of economy and growing possible and more secure."* (Aarstiderne, 2006)

Currently, there is no requirement that customers order their boxes one month in advance (A15_Aarstiderne, 2006). Thus risk sharing between the company and the consumer has decreased over time. In addition, the company has significantly increased the number of boxes customers can choose from as well as added the possibility to create one's one box and order single items. The purchaser within the company stated that the work of supplying these particular requests took 80% of his time, even though they constituted only 10% of the volume, because it was so much less efficient than the distribution of entire boxes. However, he emphasized that the customer must be made to feel they have a choice: "you give them the choice, so they have the feeling that they are having the choice, but they don't use it" (A17_Aarstiderne, 2006). Finally, multiple company members responded that the consumer was not intended to have any duties or responsibilities outside of ordering the box.

When discussing information transmission and education, the emphasis was placed on the "telling of stories" (A18_Aarstiderne, 2006; A15_Aarstiderne, 2006; A14_Aarstiderne, 2006). This story telling is primarily focused around the product itself, not around general education. When describing the newsletter, the person responsible for consumer research said that caution was taken not to overburden the customers with too much information (A15_Aarstiderne, 2006). Rather, recipes and very small amounts of product history are given. Along the same line, the purchaser as well as the consumer researcher stated that attempts were made to avoid placing too many 'strange' vegetables in the boxes as well as too much of any one thing. This is in contrast to the statement on their website, quoted above, that clearly sees an educational or transformative goal to the communication between actors. An examination of the functioning of the company reveals that their 'Haver til Maver' program for schoolchildren is the only program with a specific education goal, which in this case is to link organic foods to food culture and to nature (A16_Aarstiderne, 2006, A13_Aarstiderne, 2006).

When the perspectives of the customer and the practices of the company are merged, it is clear that the Aarstiderne food supply chain encourages an increase in range of choice, rather than a radical change. To define it another way, Aarstiderne can be seen as a unique alternative within the existing market structure, without being an alternative to this framework.

Discussion: A characterisation of alternativeness

To further analyse the presented results, four major themes are discussed in this section. First, the original research question concerning the characterisation of Aarstiderne within the context of alternative food chains is addressed. Secondly, Aarstiderne is compared to two specific food chain models. This is done to highlight some of the limitations of these models that Aarstiderne successfully addresses. Thirdly, some contradictions between Aarstiderne's ideals and practices are presented, with attention paid to the importance this has on the characterisation with the AFC context. Lastly, the relative importance of the company's environmental, economic and social concerns is discussed in relationship to sustainability.

The place of Aarstiderne within the context of AFCs

This section aims at placing the Aarstiderne model within the context of alternative food chains. As explained in the theory section on social impacts, AFCs are more or less spatially and socially integrated. Within the various models considered as AFCs, Aarstiderne are compared to CSAs, farmers' markets, farm shops, and other Danish box schemes.

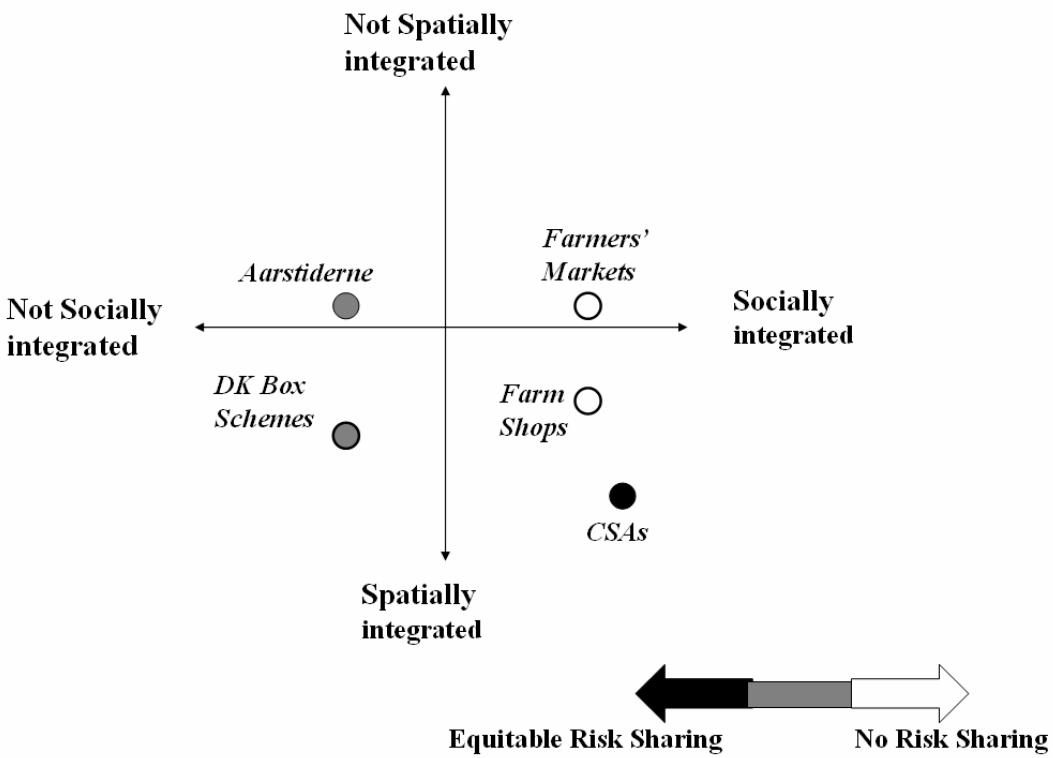

Figure 10: Characterisation of five types of AFCs according to spatial and social integration and risk sharing, Modified after Kjeldsen, 2005

A short description of each of these AFCs is found in the "Literature context and evaluation criteria" section. The comparison between these AFCs is made in figure 10 according to three main criteria:

- The spatial integration of the food chain
- The social integration of the food chain
- The distribution of risk, responsibilities and privileges among the actors of the food chain

Spatial integration

The spatial integration of a food chain has important implications for its environmental impact. The levels of spatial integration, illustrated on the vertical axis, are varied across AFC types. CSAs, as described in the theory section "An overview of alternative food chains", are considered the most spatially integrated because all the production sold is grown on the farm and distributed in the surrounding area. Danish box schemes are less spatially integrated than farm shops. This is due to the fact that, in farm shops most of the products sold are grown on the farm and other products are brought in to complete the product range. Imported vegetables will not be sold in most farm shops. On the other hand, imported fruits and vegetables constitute the majority of the products in the Danish box scheme assortments during the winter time. Consumers are usually located relatively close to the farm both in the Danish box schemes and the farm shop models. The farmers' markets would be less spatially integrated than the three AFCs above because some products are imported and because the producers and the consumers often travel further to reach those weekly events. Finally, Aarstiderne would be the least spatially integrated of the described models. This company has very centralized activities; their products travel all around the country to be packed at one place and are distributed in most parts of Denmark. There is also a large part of their fresh food products that come from outside Denmark (35 % of the vegetables and more than 90% of the fruits) (A17_Aarstiderne, 2006).

Social integration

Social integration within a food chain can lead the actors to a better understanding of the importance of sustainability (Stagl, 2002). Social integration level in the CSA model is very high. This is due to the high frequency of face-to-face contacts between various actors along the food chain; people meet at the planning meetings, at the weekly distribution and in some cases during special events organized on the farm. As relationships are based on "facework commitments", a high level of trust can be experienced between consumers and producers (Stagl, 2002). The farm shops and farmers' markets also create opportunities for social, face-to-face interactions. Some farmers even "enjoy the market experience as a social event" (Hinrichs, 2000). Creating meeting places between consumers and producers can lead to "re-establishing trust between producers and consumers" and "developing a sense of community integration" (Morris and Buller, 2003). Aarstiderne and other Danish box schemes, because people often order by internet or by mail and because the boxes are home-delivered, offer less opportunity for customers to interact with the producers or with other customers. On the other hand, they do offer on-farm activities for people to meet the company or the producers and each other. These activities, being

voluntary and sporadic, may not lead to the same levels of social integration as more regular activities.

Risk sharing

Sharing acceptable uncertainties in a food chain contributes to the creation of a better situation for all actors. It reduces the economic uncertainties for the farmers and answers consumers' concerns about food safety, health and the environment (Lamine, 2005). Risk sharing varies according to the respective level of engagement of food chain actors involved in each model. CSAs have a very high level of risk sharing because a share of the harvest is completely paid before the growing season. In this model, the consumers do not pay for a known amount or quality of product but engage to accept what the farm can produce. The level of risk sharing involved with Danish box schemes is somewhat lower because the consumers usually pay only one month in advance and do not have to take a full season engagement. In this case, planning can be more difficult for the farmers and the financial situation less secure. In the case of Aarstiderne, pre-payment is not required from the consumers and they pay for a known product of a guaranteed quality. The risk is, to some extent, shared between the farmers and the company. Even if the farmers receive no pre-payments, Danish growers have agreements and Aarstiderne does its best to fulfil them. In the cases of farm shop and farmers' markets there is no risk sharing as the consumers have no duty towards the farmers directly marketing their produce.

Overall, Aarstiderne is the least spatially and socially integrated of the five presented alternative food chains. On the other hand, its level of risk sharing along the chain is higher than in the cases of farm shops and farmers' markets, but lower than within the CSA and other Danish box schemes.

Addressing the limitations of supermarkets and CSAs

Many aspects of Aarstiderne's concept and management address the limitations of other food chains that supply organic products. As it is important in this discussion to outline the potentials and limitations of Aarstiderne as an alternative food chain for organic products, the comparative advantages of Aarstiderne in relation to supermarkets and CSAs are described.

Aarstiderne's answers to the limitations of supermarkets

One criticism of the supermarket distribution model is the lack of production history presented with the products. This makes it impossible for consumers (and especially 'ethical' consumers) to obtain sufficient information about the products and production methods (Sundkvist et al, 2005). Therefore, purchasing decisions are based primarily on price (Coff, 2006). To some extent, the information distributed by Aarstiderne about the products in the boxes allows more conscious decision-making by the consumers. Also, the fact that the consumers have access to the farms that are open to the public gives them the possibility to reconnect with the land. This is knowledge that is simply inaccessible through supermarkets.

Organic products, when marketed through conventional food chains, are sold as 'quality' products, at a premium price (Watts et al, 2005). The organic certification

label, surrounded by all the other products, therefore becomes just another brand, among many others. In this context, food is another commodity being bought and sold and the emphasis is put on the product itself (Allen and Kovach, 2000). Aarstiderne, by selling only organically produced food and by selling it through a box, diverges the focus and emphasizes the quality but also the production process. Directing the attention to the food chain makes organic products less "vulnerable to incorporation and subordination" (Watts et al, 2005).

Supermarkets often buy foodstuff in the open world market, thereby importing commodities that can be sourced in the regional market (Halberg et al, 2005). These practices give rise to cross-trading between countries, an increase in food miles and enhanced economic pressure on the farmers. Aarstiderne operates differently by prioritizing Danish-grown products and sharing economic risk with producers, through agreements and engagement. The box scheme operated by Aarstiderne also allows "the adjusting of consumption to the irregularity of production" (Lamine, 2005), therefore contributing to a somewhat improved reliance on locally-grown products.

In the supermarkets, the consumers' role is reduced to passivity (Lamine, 2005). As food supply chains are very centralized (Watts et al, 2005), the consumers often feel that they have limited power in modifying the food chain management and even in choosing the food they consume. Aarstiderne succeeds in making adaptations to consumers' feed-back by implementing accessible and widely used communication structures. Consumers' comments lead to reactions from the company. For example, a box with no potatoes will be established in response to consumers' requests (A15_Aarstiderne, 2006).

Finally, shopping in supermarkets takes time and can lead to excessive buying induced by the presence of non-food products in most supermarkets and enhanced by efficient marketing strategies (A09_consumer, 2006). Also, "consumers simply do not want to spend a lot of time and thought on selecting vegetables and fruit" (Lamine, 2005). Aarstiderne offers an alternative to that by delivering to their doorstep the consumer's choice among their various equilibrated boxes. As they offer many types of boxes, which mix fruits and vegetables and are accompanied by simple and quick recipes, the consumers' freedom of choice is respected.

Aarstiderne's answers to the limitations of CSAs

One criticism of the Community Supported Agriculture model is the inequitable distribution of responsibilities among farmers and consumers; few CSAs are "really sharing the burdens of food production or the embodied experience" (DeLind, 1999). Often, the community-building, recruiting, distribution and communication aspects are added to the burden of already overworked farmers (Kjeldsen, 2005). Addressing the challenge of providing a large diversity of vegetable all through the season is also an extra task for the farmers (Hinrichs, 2000). As an alternative to those limits, Aarstiderne proposes to offer the farmers the opportunity to concentrate on production and the company takes care of the distribution and communication with the consumers. This does limit the direct communication between farmer and consumer. However, they also allow farmers to make fewer harvests each vegetables and therefore to concentrate certain activities in time and have a simpler planning.

Another limit of CSAs is their tendency to promote social exclusivity (Watts et al, 2005). Paying in advance for the coming harvest is a strong statement to make and it has been found that CSA members differ from the overall population in their social and political involvement (O'Hara and Stagl, 2001). Becoming a CSA member may not be possible for citizens who do not have the necessary financial means or who have unstable personal situations. Aarstiderne, by asking no advanced payment, allows people to join in and opt out easily. These aspects enlarge the potential consumer base, make the model more accessible and democratize the access to organic products. Overall, this has the effect of more widely disseminating organic food consumption.

CSAs are very locally-based, distributing boxes close to their site of production. This can be another aspect limiting the number of members that can potentially be reached. For example, in Denmark, Zealand is very densely populated and there may not be enough agricultural land to feed everybody living on the island. These situations, coupled with the fact that tropical fruits and other imported products are deeply imbedded in our diet, explain that "reliance on local or regional food is neither practical nor desirable" (Sundkvist et al, 2005). Aarstiderne, by having a more centralized distribution, offers an alternative to accommodate cities and makes the distribution of organic food less spatially exclusive (Watts et al, 2005).

As members often have to drive to get their CSA box to the farm or to a drop-off point, this model may be less environmentally sustainable than it could be. In the life cycle analysis of apples done by Blanke and Burdick (2005), the transport energy used by consumers to acquire apples by car from the store was 1,15 MJ/kg. In this report, it was found that the energy used for transportation of a box in a refrigerated van from the warehouse to a consumer's house was only 0,45 MJ/kg. Home-delivery therefore has a lower impact on the environment than by car, by the consumers. Home-delivery was also identified as a feature that would potentially enhance the attractiveness of CSAs and increases its "contribution to achieving greater sustainability in food production" (Stagl, 2002).

Finally, an important limitation to CSAs in their present stage is that in the vast majority of cases they are only complementary to shopping in supermarkets (Stagl, 2002). Although this is also true for Aarstiderne, the potential for this model to be totally independent from conventional food chains is greater. As opposed to many CSAs, Aarstiderne's distribution is not limited to the local growing season but operates all year-round. Importation and the possibility to buy separate items and to make specialty box requests also widen the consumer choice and allow consumers to keep similar or unchanged food habits while buying exclusively through Aarstiderne.

To conclude, Aarstiderne answers many limitations of both conventional and alternative food chains. Some characteristics of this model make it an interesting marketing channel to increase the number of citizens buying organic while protecting, to a certain extent, the organic certification label and its link to the production history. The convenient ordering and delivery also makes it more accessible, which was cited by the consumers as one of the major reasons to buy

from Aarstiderne. Aarstiderne, because it is a very popular and successful alternative food chain, with 45 000 customers in Denmark, is a worthwhile source of inspiration.

Contradictions between ideals and practices

Though our original goal was to characterise Aarstiderne within the context of alternative food chains, in doing this project we have become aware of many ways in which the company's practices do not always fulfil their promoted ideals. This is important within the characterisation of the alternativeness of the Aarstiderne food chain because the ideals of the company may promote a significantly different alternative food chain than the one that is in truth created by their current practices. Therefore, this section pinpoints three specific contradictions between ideals and practices that we feel have important implications for the evaluation of the Aarstiderne food chain. In addition, we offer modest proposals of how some of these contradictions to be resolved. For all three, it is important to note that the discussed contradiction is based upon our interpretation, and may not be perceived as a contradiction by Aarstiderne.

Transparency

Regarding transparency, Aarstiderne claims to aim at very high standards: "All employment contracts, wage levels, energy costs, shareholders agreements -you name it- will be in the public domain." (Aarstiderne, 2006). However, significant discrepancies between the company's vision and policies and their actual management were noticed during the study process. They can be classified in three sections: information about the product history, the open-book policy and the fair trade policy.

<u>Product history</u>

> *"The products are supplied with recipes and stories about growers, production, farms, the company, food products and quality"* (Aarstiderne, 2006).

This quote, taken from the company's website, can be interpreted as a company will to make the complete product history available to the consumers. However, the lack of transparency about the product history was an important obstacle to the environmental impact assessment. Although it is possible for Aarstiderne's purchaser to know the specific farm on which each imported product is produced, this information is often not retrieved and not distributed to the consumers (A17_Aarstiderne, 2006). For imported products coming from outside Europe, the information available on the website and the newsletter is often limited to the country of origin. For European products, the name of the farm is sometimes missing or replaced by the name of a cooperative including many farms. As Aarstiderne is functioning within a globalised food supply system, it is also not possible, for imported products, to follow the path they took from the farm to the table. Products bought by Aarstiderne were often bought, sold and transported many times before reaching the packaging plant (A17_Aarstiderne, 2006). This prolongs the food chain and makes transparency more difficult to achieve. Lastly, product histories are missing information concerning the type of transportation method used, which is relevant for an assessment of environmental impact.

Open-book policy

> *"The company will open its books - making all transactional information available to customers and suppliers. Everybody will know what we are paying for carrots - how many carrots it costs to operate the box scheme and what margins the different boxes fetch on the doorsteps. […]We feel that the time has come to do this"*. (Aarstiderne, 2006).

This quote, found on Aarstiderne's website, is taken from a transcript of a speech given by Harttung in 2003. Even though he felt the establishment of an open-book policy would be done shortly after this speech, it is still not a reality in 2006. This also had consequences on the conduct of this study because it was impossible to establish the distribution of money along the food chain. As Aarstiderne buys imported products through wholesalers, the purchaser himself does not know the price farmers receive for the products sourced outside Denmark (A17_Aarstiderne, 2006). This is another issue diminishing the transparency of the company transactions and the knowledge on which consumers can base their purchasing decisions.

Fair trade policy

> *"[…] we intend to launch a domestic fair trade initiative in early 2003 - and stretch it to our international partners later in the year.[…] We believe that through transparency ethical trade can flourish.[…] All pricing will be based on actual cost of production, a fair profit and some resources towards investment and human development on the farm."* (Aarstiderne, 2006)

Although Aarstiderne made these intentions public in 2003, there is still no fair trade policy implemented in 2006. During the interview, Aarstiderne's purchaser justified this by explaining that it was a "rather tough discussion", especially because of the costs involved in monitoring such a policy. He argued that 'fair trade' principles were applied by giving a good price for the products when dealing directly with the suppliers, especially in Denmark and in Spain. On the other hand, he also said that working conditions were not taken into account when choosing suppliers abroad (A17_Aarstiderne, 2006). Therefore, the extent to which fair trade principles are applied within the company is not clear. This transparency issue limited our ability to carry out an assessment of the social impacts of the company, notably in terms of the social equity brought to the stakeholders. To be transparent and act according to its own vision, Aarstiderne must establish a clear policy and disseminate it through its usual communication channels.

Consumer-producer link

> *"Aarstiderne has re-established the communication between those who produce the food and those who consume it – a farmer to citizen communication – soil to plate - in a contemporary way. This communication on one hand helps the farmer in getting a true picture of what the everyday consumer thinks, and on the other hand improves the understanding among the consumers of variations in seasons and challenges weather-wise. This vehicle of communication is useful for other purposes as well such as transferring knowledge of sustainability and consideration for nature and health."* (Aarstiderne, 2006)

From this, we can see that Aarstiderne has explicitly valued the consumer-producer link. From this perspective, the link should be a means of communication of specific information, such as consumer desires, the seasonality of production, and elements of health and sustainability. On the other hand, communication with the consumer is primarily through the website, the newsletter and the contents of the box itself. These three mechanisms offer only limited opportunity for the transmission of knowledge concerning sustainability and health. There are three specific aspects that restrict the flow of this knowledge: the diverse choice of boxes, the efforts of the company to adjust box contents to consumer desires, and the high proportion of off-season imported products. It is understood that Aarstiderne does not wish to impose anything on their consumers, rather offering them the information necessary to make their own choices. The centralised mediation of the producer-consumer link forces a processing of information. Within the company, information coming from the field is subjected to an interpretation of the consumers' desires. In other words, the content of the box is defined not only by what is available on the market but also by what the consumers have told the company they want. Therefore, consumers receive a reflection of their own desires instead of a true representation of production conditions. Thus the consumer-producer link is indirect and corrupted.

Additionally, it has been shown that face-to-face communication between the producer and the consumer is minimal. This is even true for producers within the company, since the Billeslund farm, the main site of Aarstiderne's vegetable production, is not one of their visiting farms. Face-to-face communication is important in the formation of stable social relations and trust (O'Hara and Stagl, 2001). The invitation made to producers to participate in activities on the visiting farms is not a realistic connection between producer and consumer, since it imposes additional duties on the producer. In the Haver til Maver program, emphasis was placed on the fact that the children were visiting a working farm, and this was crucially important to the authenticity of the program in the mind of its chair (A16_Aarstiderne, 2006). This mentality could be institutionalised throughout the Aarstiderne food chain, by providing institutionalised support and advertisement for activities on producers' farms, including the company's own production farm at Billeslund. This would provide a very concrete, face-to-face connection between consumer and producer that would perhaps better match the importance that the company places on this link.

Regionalization of food production

To discuss Aarstiderne's vision of regionalization of food production, Harttung's vision of the long-term future (10 to 20 years ahead) is presented below. We understand that this is his personal vision, not that of the company as a whole. However, due to Harttung's central importance within the company, we feel that we are justified in comparing his ideals to the practices of Aarstiderne.

"We think that one of the things that we could do was to develop a farming model which basically takes the entire food industry back on to the farm. [...] Everybody knows what are micro-breweries but let's have micro-dairies, let's have micro-juice plants, let's have micro-everything. Basically you decentralize food production, take it back onto the farm where originally belonged. And then, those farms will cease to be just a family farm, they will be complex structures with lots of people working there, with lots of background and lots of stuff going on.[...] "Aarstiderne used to be a regionalized model and it then centralized basically to solve some great specific problems, but I think it will regionalize again." (A14_Aarstiderne, 2006)

The actual centralization of Aarstiderne's vegetable production on a single farm was discussed earlier in this case study. From our point of view, so far there have been few policies or actions taken by the company towards the direction of decentralization. Currently, the company, named after the seasons, practices very limited seasonality in terms of its total range of products, which they argue is due to the demands of the consumer (A14_Aarstiderne, 2006). However, by supplying these consumer desires, it is not likely that in the near future people will define themselves as being part of a "foodshed", as proposed by Harttung (A20_Aarstiderne, 2006). If it was necessary to centralize Aarstiderne's model to answer important financial problems, it is difficult to see how it could be economically viable to regionalize it again in an increasingly globalised world. It is therefore not obvious, to an observer that the way Aarstiderne evolves now will lead to decentralization of agricultural production in the future.

We understand that the feasibility of the 'foodshed' idea in Denmark is not clear given current socio-economic structures. Currently, 45% of the Danish population lives on the island of Zealand, which comprises only 23% of the total Danish land. Because of this disproportion, decentralizing agriculture would require deep structural changes within the society. The Copenhagen area is even more densely populated, with 637 inhabitants per square kilometer (Statoids, 2005). Considering that each human needs 0,2 ha (0,002 km^2) to answer his food need (Gunther, 2001) it seems, at least for urban areas, that the foodshed concept is not practical.

Balancing criteria of sustainability within company decision making

Implicit within many of Aarstiderne's ideals, there exists a general reference to the goal of sustainability. To achieve sustainability, a delicate balance between environmental, economic and social concerns must be met. Throughout the global business community, there is increasing awareness that attention must be paid to the

inclusion of environmental and social, as well as economic, concerns in the decision-making process. Returning to the Global Reporting Initiative, we can see that even within a business context, environmental and social impacts play a crucial role in determining the overall performance of a company:

> *"The borderless global economy requires equally borderless governance structures to help direct private sector activity towards outcomes that are socially and environmentally, as well as economically, beneficial. […] As society witnesses the growing influence of corporations in driving economic, environmental and social change, investors and other stakeholders expect the highest standards of ethics, transparency, sensitivity, and responsiveness from corporate executives and managers."* (GRI , 2002a).

In addition to this, recent emphasis in public policy, as well as within the literature, has been placed on the sustainability of food chains (Sustain, 2002; Curry Report, 2002; Ilbery and Maye, 2004). This sustainability aims to achieve "mutually reinforcing benefits" between the sectors of economy, environment and society (Curry Report, 2002, as quoted by Ilbery and Maye, 2004.) Therefore, we conclude that decision making within a responsible company would reflect equal attention paid to economic, environmental and social concerns.

Given this expectation, we are now able to discuss the relative importance of economic, environmental and social concerns as reflected by the decisions making process of Aarstiderne. Specifically, we evaluate two types of decisions: those relating to choice of supply outside of Denmark and those relating to choice of supply within Denmark. Before doing this, we examine the overall image the company projects in relationship to the importance of these three aspects. We conclude with a suggestion of a framework for balancing the three aspects of sustainability which would also help Aarstiderne achieve increased transparency.

Aarstiderne's projected image

Based on Aarstiderne's website, which is the most public venue for company information, attention has been paid to the integration of economic, environmental and social concerns. The company makes statements such as "ecology goes hand in hand with economy" and "Aarstiderne has become a brand for thinking in holistical (*sic*) and sustainable realms" (Aarstiderne, 2006). On the other hand, economic security is clearly given a priority within the company. This is evidenced by website statements, such as "Financial sustainability is a precondition for securing the sustainability of the idea and the jobs created- and thereby of the organic farms" (Aarstiderne, 2006). In addition, the idea of compromise, in order to insure economic success, has been communicated to the research team numerous times (A14_Aarstiderne, 2006; A12_expert, 2006). Thus the company does not decisively place equal importance on economic, environmental and social concerns.

Supply outside of Denmark

Aarstiderne's original idea of using a box scheme, as stated by the website and also in line with the inspiration of CSAs, was to make the link between ecology and

economy, in the sense that variations in production would be reflected in what the consumer receives in their box. To some extent this idea has been corrupted by the extreme choice they now offer their consumers in terms of different boxes, as well as in the *de facto* criteria for making up the boxes. This was best said by their purchaser, when speaking of buying produce outside of Denmark. Admittedly, the purchaser is compelled to consider finances when making buying decisions.

> *"We have a fantastic idea here, I think, because we decide what we put into the boxes and then we can look into the market and see if there is a big overproduction of tomatoes, then we can use a lot of tomatoes for cheap money. And then if the melons are more expensive we can drop the melons just for one or two weeks and then we can use them again."* (A17_Aarstiderne, 2006)

This statement reflects that financial considerations are the primary motivation behind the decisions concerning supply from outside Denmark; environmental and social concerns are not explicitly considered, except when they are manifested in the mechanism of price.

This lack of specific criteria concerning environmental and social impacts when considering foreign suppliers is revealed in two other noteworthy ways. Firstly, as has been noted, there is currently no stated fair trade policy within the company. It is unclear to what extent working conditions, social equity, or labour practices are taken into account when selecting suppliers. When asked, the purchaser explicitly said that working conditions on farms were not considered important when choosing suppliers (A17_Aarstiderne, 2006). This disregard allows the more explicit economic considerations, namely price, to pre-empt social considerations when selecting foreign products.

Secondly, though energy accounting has been done for the farms owned by the company, there is currently no energy accounting done for the supply and distribution of produce. This is true for products coming from outside of Denmark as well as those from within the country. The choice of foreign suppliers is not made with attention paid to 'food miles,' or the distance travelled by the product, though some concern is made to make contact with the first wholesaler within Europe for products from outside of the E.U. (A17_Aarstiderne, 2006). Again, the lack of concrete criteria in terms of social and environmental impacts allows economic considerations to assume a level of importance that may not reflect the image of holistic sustainability that the company wishes to project.

Supply within Denmark

Insufficient attention to environmental and social impacts may also be reflected in decisions concerning supply within Denmark, though this may not be as obvious as in the case of imported supply. It is clear that the company has a long term goal to produce as much of their own vegetables as possible and they have been taking concrete steps towards achieving this goal. They have significantly reduced the number of their suppliers within the past two years, while at the same time increasing the number of hectares under vegetable production on their Billeslund farm. One

interpretation is that this decision was taken for reasons of business autonomy, without full attention to the sustainability of this decision. The purchaser felt that it was always easier to work with fewer suppliers, though the risks were greater (A17_Aarstiderne, 2006). In addition, the chair of the company felt that a cooperative structure would not have allowed the company to make the quick decisions that were required in order to survive (A14_Aarstiderne, 2006). Though this decision may not reflect purely economic motivations, a concentration of production may entail negative environmental and social impacts.

Specifically, the decision to concentrate production may cause more importation of produce that otherwise could be produced in Denmark. Many producers mentioned that this limited supply base may force the company to purchase imported produce if ever there were crop failures on their farms. The purchaser within the company also mentioned that this foreseeable reality could be quite difficult to cope with from his point of view, because he would be faced with finding a large quantity of produce on the open market (A17_Aarstiderne, 2006). This increased risk involved with the concentration of production could therefore lead to amplified dependence on producers with whom the company does not maintain long-term relationships as well as increased importation of supply. Based on the results of the environmental impact section of this report, we can see that increased importation can be seen as having potentially negative environmental consequences, in terms of increased energy consumption. In addition, the dependence on occasional suppliers increases the risk that the company will buy from suppliers that do not adhere to the company's organic vision.

Concentration of production also contributes to the pattern of decreasing viability of livelihoods based on organic vegetable production within Denmark. This pattern has been described as inevitable by many within the company (A14_Aarstiderne, 2006; A17_Aarstiderne, 2006), but this fatalism, combined with their efforts to produce all of their own produce, may be actively reducing the number of organic vegetable farmers that are able to continue producing. In addition, certain technologies are currently being discussed by Aarstiderne that are financially feasible only for large operations, such as GPS weeding systems (A18_Aarstiderne, 2006). The use of such technologies could lead to a decrease in overall rural labour requirements. Even if this is not the case, by meeting all of their Danish vegetable needs through their own production, the means of production and all decision making will nonetheless be concentrated in the hands of one company, Aarstiderne, meaning that instead of organic farmers there will be an equivalent number of organic workers. This has potentially negative consequences in terms of long term rural development. The decision to concentrate supply within Denmark therefore does not adequately address the company's goals of holistic and sustainable development.

Framework for decision making

In order to more equitably distribute environmental, economic and social concerns, we suggest that the company develop a specific framework within which to evaluate decisions. This framework should lead to the development of thresholds for environmental and social concerns that could be made explicit to everyone within the company, as well as to consumers and the general public. Indeed, even economic criteria in decision making could be made more transparent by the implementation of

the proposed open-book policy. Already, there are decisions being made within the company that clearly reflect a balance between economic, environmental and social concerns. Examples of this include the Barritskov farm management and nature plan, the green accounting on all farms, and the use of re-usable wood boxes for distribution. In addition, there is a deadline for the implementation of all biodegradable packaging, which again points to a move towards concern for environmental and social impacts. These decisions indicate that Aarstiderne is actively making progress towards more balanced decision making. Overall, we believe that the implementation of a more explicit decision making framework, including environmental and social criteria as well as economic criteria will increase transparency, harmonisation throughout the company, and the long term sustainability of this food chain.

Conclusion

This study describes alternative food chains in terms of their ability to provide a more sustainable distribution system as compared to conventional food chains. Within this context, the environmental, economic and social impacts of the Danish organic company Aarstiderne are characterised. Certain results and conclusions from this characterisation are worth highlighting. Firstly, using the life-cycle analysis tool, it is seen that the company's best selling box, the *Stor MixKasse*, produces an environmental impact that is comparable to a conventional food distribution chain in the Netherlands. This contrasts with the results of the environmental evaluation of the company's internal operations, which show that significant conservation measures and recycling principles are currently practiced. Secondly, Aarstiderne was described by its suppliers as providing a positive marketing channel for organic products. However, the long term survival of this channel is threatened by the company's intentions to narrow their Danish suppliers to their own farms. Finally, the Aarstiderne food chain increases the diversity of organic food chains. However, due to the specific types of spatial and social integration of this food chain, this increased 'choice' does not significantly 'change' the existing market structure. Together, the Aarstiderne food chain model succeeds in addressing some limitations of both conventional food chains and spatially exclusive food chains. At the same time, the company's ideals may be better promoted through a more conscious attention to the holistic sense of sustainability.

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A03_producer, 2006, Phone interview with a current supplier of Aarstiderne, 24-05-2006, Frederiksberg

A04_producer, 2006, Mail survey returned by a current supplier of Aarstiderne, 24-05-2006, Frederiksberg

A05_producer, 2006, Phone interview with a former supplier of Aarstiderne, 24-05-2006, Frederiksberg

A06_producer, 2006, Phone interview with a former supplier of Aarstiderne, 24-05-2006, Frederiksberg

A07_consumer, 2006, Interview in person with a current female customer of Aarstiderne, 26-05-2006, Copenhagen

A08_consumer, 2006, Phone interview with a current female customer of Aarstiderne, 29-05-2006, Frederiksberg

A09_consumer, 2006, Interview in person with a current male customer of Aarstiderne, 29-05-2006, Frederiksberg

A10_consumer, 2006, Phone interview with a current male customer of Aarstiderne, 29-05-2006, Frederiksberg

A11_consumer, 2006, Interview in person with a current male customer of Aarstiderne, 02-06-2006, Copenhagen

A12_expert, 2006, Interview in person with Chris Kjeldsen, author of the PHD thesis "Modernitet, tid, rum og økologiske fødevarenetværk", 19-05-2006, Frederiksberg

A13_Aarstiderne, 2006, Phone interview with Christian Møller, Aarstiderne's restaurant manager, 24-05-2006, Frederiksberg

A14_Aarstiderne, 2006, Interview in person with Thomas Harttung, Aarstiderne's co-founder and chair, 31-05-2006, Odense

A15_Aarstiderne, 2006, Interview in person with Philip Thestrup, in charge of consumer research for Aarstiderne, 01-06-2006, Krogerup

A16_Aarstiderne, 2006, Interview in person with Thomas Nielsen, in charge of the program "Haver til Maver" for Aarstiderne, 01-06-2006, Krogerup

A17_Aarstiderne, 2006, Interview in person with Per Stilling Andersen, in charge of Aarstiderne's purchasing department. 01-06-2006, Bjæverskov

A18_Aarstiderne, 2006, Phone interview with Svend Daverkosen, Barritskov's farm manager for Aarstiderne, 02-06-2006, Frederiksberg

A19_Aarstiderne, 2006, Observations and informal interviews with teachers bringing classes to Haver til Maver Program, 01-06-2006, Krogerup

A20_Aarstiderne, 2006, Thomas Harttung conference at the Organic Congress in Odense, 31-05-2006, Odense

Appendices

Appendix A: Values used in the calculation of CO_2 emissions and MJ consumption for various transportation modes

Mode of transportation	MJ / 1000 kg	CO_2 g / km
Refrigerated transport boat	0,1	0,010
Refrigerated long distance transport truck (freightliner)	1,1	0,063
Refrigerated delivery van	8,0	0,458

Appendix B: Values used value in the calculation of MJ consumption for the different types of packaging material

Material	MJ / kg
Paper	35
Plastic	85
Wood	15

Appendix C: Questions to Aarstiderne personnel

Supply Department/Logistics

1. What percentage of your products comes from within Denmark (from within specific regions if this is monitored)?
2. What percentage comes from within Europe? And what percentage comes from outside of Europe?
3. How do you fix prices for the boxes?
4. How do you fix prices given to the farmers for their products (in Denmark and for imports)?
5. What type of agreement do you have with your suppliers? (Contract on a given quantity to be delivered at a certain time and/or call for deliveries a certain time before needed?)
6. Is it possible to know the price you paid for every item in one of the *Stor MixKasse* and one of the *Dogma Kassen*?
7. What are you criteria for choosing your suppliers abroad? In Denmark?
8. What do you require from your suppliers?
9. Do you compete with supermarkets or other distribution channels for consumers?
10. For suppliers?
11. (Do you follow supermarket prices/quality/conditions offered to farmers and consumers)

12. Do you know the exact origin of every product you buy? For example last week you had courgette in the *Stor MixKasse* and they come from the cooperativa primavera, do you know where they were grown? Should we contact them to know how much the producer received for it?
13. Do you know the distances and the mean of transportation for the items in the *Dogma Kassen* and *Stor MixKasse* for weeks 21 and 22?
14. Do you know the material used for packaging fruit and vegetable in your boxes? (What kind of plastic...)
15. Do you know the quantity and the nature of recycled material generated per week?
16. Do you know the quantity of waste (not recycled) produced per week?
17. Do you which quantity of water you use for your operations? Do you treat your waster water?
18. Do you take into account environmental criteria when designing new building and facilities?
19. Do you import fruits and vegetables that can be sourced in Denmark?
20. Under which conditions, why and when?
21. Does the company have a fair trade policy?

Outreach coordinator and restaurant manager

1. Can you specifically describe your role within the company? Specific duties, responsibilities, concerns, etc.
2. Can you describe the outreach activities you are responsible for?
3. How long have they been operating?
4. What sort of volume (number of participants) do they see per time period?
5. Do they generate income or profit for company? How much (relative to other activities)?
6. Does Aarstiderne organize any other outreach activities in Jutland? (Who is responsible for these?) Any in Zealand? (Who is responsible for these?)
7. Does Aarstiderne organize any outreach activities in conjunction with suppliers (such as activities on farms that are not owned by Aarstiderne)?
8. For each activities
    1. Who does this outreach activity try to target?
    2. Is it designed for box consumers or others?
    3. Is it designed to attract more box subscribers?
    4. What is the principal goal of this outreach activity, from the perspective of Aarstiderne?
    5. (what type of education, what type of `connection', etc.)
    6. Has this goal changed over time? Why?
    7. What do you feel is the main reason people participate in this activity?
    8. What do you feel is the main outcome, overall, from this activity?
    9. From a practical point of view, how do you feel this activity is going?
    10. What are the main difficulties associated with this activity?
    11. Does the box consumer have any duties in relationship to the company, to other activities?
    12. Has this ever been a part of the box scheme? Has is ever been considered?
    13. Is there any motivation to enhance the consumer-producer link within these activities?

Thomas Harttung, founder of Aarstiderne

1. What is your background, where do you come from? What did you do before Aarstiderne?
2. What was your original idea when you changed to organic production?
3. How would you translate the name of your first company (the herbal company)?
4. How did Aarstiderne evolve from the initial box scheme?
5. How did you finance the company at the beginning?
6. How is your vision of this company evolved over time?
7. Do you think it is important to strengthen the consumer/producer link? Why? How do you do that at Aarstiderne?
8. What are some of the challenges Aarstiderne has faced?
9. What are the compromises you feel you had to make to keep the company going? (ask about importation if he doesn't mention it)
10. What makes Aarstiderne different from a supermarket? From other box schemes?
11. We understand you have done a lot of work networking Aarstiderne with other organisations, such as MSF and others. Can you describe some of the links your company has with other organisations and why you feel this has been important?
12. Do you engage in any political activities in your capacity as the chair of Aarstiderne (lobbying, etc.)? (Related question: Do you feel your work with Aarstiderne has political implications?)
13. Why do you think producers like to work with Aarstiderne?
14. Why do you think consumers like Aarstiderne?
15. What do you see for the future of:
    a. Consumers
    b. Grow your own things
    c. Suppliers
    d. Expand to other markets
    e. Education, awareness, outreach
    f. Environmental commitment
16. Why and how did you reduce the number of Denmark suppliers from 30 to 6?
17. Do you think the name Aarstiderne still fits the company?

Farm Manager

1. <u>For the different farm, who Own it</u>, land use, type of crop, green houses (what type)?
2. Can you tell some yields/ha of the last season? Are yields increasing on the farm? If yes, why?
3. Do you have problems with? Specifically in which crops?
4. Do you produce your own seeds? Which %?
5. Are you doing any selection/breeding?
6. What are the main criteria for choice of variety?
7. Do you use F1 hybrids? Which%?
8. How many "old" of "heirloom" varieties have you reintroduced in your farm?
9. Do you follow moon phases?
10. Education: guided tours? School activities? Other?
11. Nature conservation: Hectares of forest? Hedges? Do you have a nature plan (briefly describe)?

12. From 2000 to 2006 which aspects of this farm have changed and how? (Nature, landscape, productions, structures, crops…)
13. Did you start with new crops? Stopped others?
14. Which are the main objectives for the future?
15. How many employees? Full time, Part time
16. Organisation: Agronomists: How many? Specialisation?
17. Workers in the fields By hand or With machinery
18. Do you have Administration workers or other employees?
19. Are you planning to reduce your employees using more machinery? Do you feel this would be possible or beneficial?
20. Do you use cover crops during winter in order to prevent N leaching? Do you use other strategies?
21. Do you have problems of soil compaction?
22. Do you have problems of soil erosion?
23. The most commonly used rotation on the farms: For vegetables and For cereals
24. Which investment sources did you have from the beginning until now?
25. Do Aarstiderne still rely on some kind of investment from the outside?
26. What decision power do these investors have in the company?
27. How long did it take before Aarstiderne could make any profit?
28. Why do you think the company was loosing money (or at least not making profit)?
29. What decision in the company or circumstance changed its economic situation?
30. Did you have to make compromises about the original ideas and principles to be able to achieve profitability?
31. Do you make more money out of the food production than out of the food distribution?
32. Would you have any economic advantage to produce more of the vegetables you sell?
33. Why do you keep increasing your own vegetable production at Aarstiderne?

Appendix D: Questions for Aarstiderne suppliers

1. How big is your farm (land area, number of employees)?
2. How long have you been in business with Aarstiderne?
3. What proportion of your production do you deliver to Aarstiderne?
4. What products do you deliver to Aarstiderne?
5. Were any changes on your farm driven by your business relation with Aarstiderne? Which ones? (Did your business with Aarstiderne change the way you make your decisions on the farm?)
6. Does business with Aarstiderne impact on your:
    a. Production choices and schedule
    b. Wastes on the farm (acceptance of variability in size, shape, colour, quality)/Quantity sold per unit area or time period
    c. Financial security (price and quantity uncertainty)
    d. Prices and revenues
    e. Direct costs/transaction costs (packaging, transport, time used for negotiation, planning, paperwork…)
    f. Branding
    g. Relationship to your customers
7. How would you describe your local market? (What are the boundaries of “local” in your opinion?)
8. How much do you trust this distribution channel?
9. Do you have other distribution channels?
10. Are you looking for other distribution channels, what kind and why?

Appendix E: Questions for former Aarstiderne suppliers

1. How big is your farm (land area, number of employees)?
2. How long have you been in business with Aarstiderne?
3. What proportion of your production did you deliver to Aarstiderne?
4. What products did you deliver to Aarstiderne?
5. Were any changes on your farm driven by your business relation with Aarstiderne? Which ones?
6. (Did your business with Aarstiderne change the way you made your decisions on the farm?)
7. Did business with Aarstiderne impact on your:

    a. Production choices and schedule
    b. Wastes on the farm (acceptance of variability in size, shape, color, quality)/Quantity sold per unit area or time period
    c. Financial security (price and quantity uncertainty)
    d. Prices and revenues
    e. Direct costs/transaction costs (packaging, transport, time used for negotiation, planning, paperwork…)
    f. Branding
    g. Relationship to your customers

8. How would you describe your local market? (What are the boundaries of “local” in your opinion?)
9. Why did you stop delivering to Aarstiderne?
10. Did it have an impact on your business?
11. What impact?

Appendix F: Questions for Aarstiderne box-scheme customers

1. How long have you been an Aarstiderne subscriber?
2. Which box do you order most frequently?
3. How did you hear about Aarstiderne?
4. Why did you decide to begin subscribing?
5. Has that reason changed over time?
6. Have you ever participated in or seen any other Aarstiderne activities other than ordering the box? (Farm visits, web forum, etc.)
7. Has your box subscription changed anything about the way you buy your food (other than buying the box itself)? (specifically probe for whether they buy more organic or not)
8. Has your box subscription changed anything about the way you prepare your food?
9. Has you box subscription changed anything about the way you eat?
10. Has your box subscription changed anything about your interaction with the farmers producing your food?
11. Has your box subscription changed anything about your social life (new friends, contacts, etc.)
12. Is there anything you dislike about your subscription? Anything you would like to see changed?
13. What would make you discontinue your subscription?
14. Before beginning your subscription, did you purchase organic foods regularly?
15. Currently, outside of your subscription, do you purchase organic foods?
16. If yes, what is your main motivation for buying organic? (Is this influenced by Aarstiderne box?)
17. Have you ever been in contact, in any way, with producers of your food (other than through your box subscription)?
18. What would you consider to be “local food”? What are the boundaries of this for you?
19. Do you think you have an economic advantage in buying the box (over buying your food at the supermarket or other retail)?
20. Do you think you have other non-economic advantages in buying the box?
21. Are you interested in knowing where, how and by whom your food is produced?
22. Do you know who grows your food?
23. Do you think you have enough information about where, how and by whom your food is produced?