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The food cluster in the Øresund region

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Introduction

This report tells the story of the food cluster in the Øresund region, which is located in the areas of Sjælland in Denmark and Skåne in Sweden.

The Øresund region is a major European innovation centre with forecast annual growth rates of 2–5 % for the years 2006 and 2007, higher than the economy as a whole.[1] The cluster has developed as a result of the transition of the food sector in the region from holding activities, primarily directed towards the food industry, to – food-science activities.

To stay competitive, many companies in the food cluster are involved in developing and producing functional food. Functional food production has high potential growth rates because of consumer trends and rising lifestyles. The potential demand for products in the food and health sector is estimated to show annual growth rates between 15–25%.[2]

Functional food has specific functions for heath promotion or performance enhancement effects. The functional products vary in shapes and in the specific functions, but the desired outcome is a scientifically proven effect.[3]

As well as having relatively high growth rates, the food cluster in the Øresund region hosts the full value chain in the food sector and has a high interaction between world-renowned scientific and research institutions and internationally recognised food companies. The interplay and cooperation between the different types of companies and the long-term strategy and support from the authorities are central to the competitive advantages and the ability to develop innovative products and processes in the food sector.

This report focuses on food industry access to science-based knowledge as an explanation of the competitive advantage of a single company and of the cluster as a whole. The report is based on desk research and face-to-face interviews with representatives from Øresund Food Network (ØFN), Skåne dairies, and the small innovative biotechnology company, PROBI AB.

The Øresund region

The Øresund region is one of the few integrated border regions in Europe. It is based on the geographic territories of Skåne in Sweden and Sjælland, Bornholm, Lolland, Lolland-Falster, and Møn in Denmark. The two countries are separated by Øresund, but connected by the Øresund Bridge, which is 16 km long, and by the ferries crossing the Sound every 20 minutes. The region and the food cluster is centred on Copenhagen on the Danish side and Malmö and Lund on the Swedish side.

Figure 1 is a map of the region.

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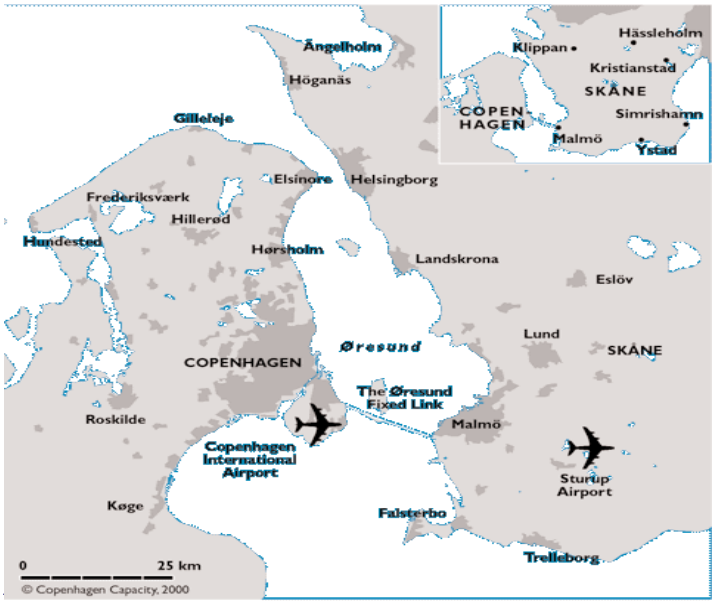
1 **http://www.foodoresund.org**

2 **http://www.foodoresund.org**

3 Mark-Herbert, C. 2002

Figure 1: *Centre of the Øresund region*



Source: *ØSR*

The science-based Øresund region is primarily an outcome of political vision. Since 1960 politicians on each side of the Sound have acted to develop an integrated region based on Swedish and Danish territories. The agreement in 1991 to build a bridge connecting the two sides of the Sound, the completion of the bridge in 2000, and the ever increasing commuting has paved the way for the establishment of an integrated region.[4]

Table 1: General statistics on the Øresund region

Area	20 859 sq km
Population	3.6 million
GNP (2004)	€108.4 bill.
Work force	1.7 million

Source: **http://www.oresundsregionen.org**

The Øresund region is one of the most dynamic in Europe, and is developing rapidly. Today it generates a quarter of the combined GDP of Sweden and Denmark.[5]

[4] Øresunds brokonsortiet 2006

[5] Øresund: **http://www.oresundsregionen.org**

A science region

One important political objective of the Øresund region was to create an area that emphasised the development and commercialisation of new technologies. Special attention was given to science and the development of human resources through universities and science parks to strengthen workforce competencies.

Today the Øresund region has 14 universities and 140,000 students, making it one of the leading university centres in Europe in terms of scientific articles.[6] Cooperation among the universities has resulted in the establishment of the Øresund University with the objective of strengthening regional cooperation and integration between the region's universities, industry. and public sector.

The amount of investments and available resources in research and development (R&D) in the region is one of the highest in Northern Europe, as shown in Table 2.

Table 2: *R&D resources in the public and private sector in selected European regions (date not indicated)*

	Private R&D		Public R&D	
Region	**Employment**	**Costs[7] (million euro)**	**Employment**	**Costs (million euro)**
Øresund region	27,543	322	21,635	641
Stockholm	16,611	334	15,785	578
Helsinki	15,292	158	14,526	N/A
Berlin	14.554	160	23,182	N/A
Hamburg	8,427	106	8,096	382
Amsterdam	6,820	70	N/A	N/A

Source: *Copenhagen Capacity:* **http://www.copcap.com** [8]

The Swedish and Danish governments' transnational initiative to establish the organisation Øresund Science Region (ØSR) in 2001 is an important initiative to create a region based on science and a highly educated workforce. The ØSR combines Danish and Swedish private and public R&D resources in research and innovation platforms. ØSR responsibilities include the food industry and it carries out its activities in connection with the University of Lund in Lund and with universities in the Copenhagen region in Ørestad City near the airport at Kastrup, Denmark.

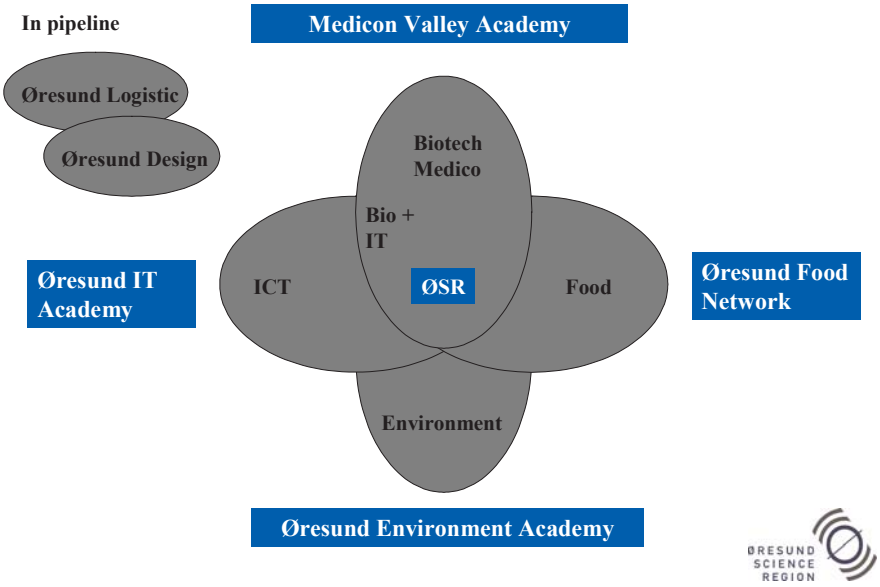
ØSR includes six regional research and innovation platforms consisting of the Medicon Valley Academy, Øresund IT Academy, ØFN, Øresund Environment Academy, Øresund Logistics, and Øresund Design.

[6] Copenhagen Capacity: **http://www.copcap.com**

[7] All euro equivalents calculated at an exchange of 7.4 Danish kroner.

[8] Copenhagen Capacity refers to data from 2003 from Danish Ministry of Economic and Business Affairs.

Figure 2: *The research and innovation platforms of the Øresund Science Region (ØSR).*



The six platforms benefit from the synergies of overlapping interests. For example, the Medicon Valley Academy and the ØFN started a new collaboration on functional foods and nutriceuticals, which includes developing ingredients and additives to enhance the nutritional effects of food products. The initiative focuses on the use of food products in disease prevention and treatment. Public. private, and other funds contribute 25% and 75%,[9] respectively, to the organisation.

Collaboration initiatives were initiated politically to enhance the cooperation and interaction among Swedish and Danish companies and institutions. For example, the small biotechnology company PROBI AB participated in an initiative by Øresundskonsortiet[10] in 2000 to enhance the interaction between the two countries and they still have regular meetings with these institutions, which contribute positively to the knowledge base of PROBI AB.[11]

As an umbrella initiative the ØSR supports six different innovation and technological development areas, of which the Øresund Food Network is one. The ØSR facilitates knowledge sharing and collaboration across the six platforms.

Overview of the food industry in the cluster

The food cluster is a central part of the science region and has many of the characteristics of the region in general. This implies that the food cluster puts a strong emphasis on R&D and on cooperation and interaction with other companies and institutions in the region. The companies in the cluster also participate in informal and formal networks anchored inside and outside the cluster.

[9] The Øresund Science Region: **http://www.oresundscienceregion.org**

[10] The Swedish and Danish syndicate, which undertook the establishment of the bridge between the two nations.

[11] Interview with PROBI AB

The region is dominated by global consumer brands like Nestlé, ARLA, Danish Crown, and Beauvais, but small specialised food and drink producers are also found. The manufacturing activities are often located on the outskirts of or outside the cluster, while the headquarters and R&D departments are more often in the centre of the Øresund region, i.e. in the costal area around Greater Copenhagen and Malmø/Lund.

Traditionally activities in agriculture and food companies producing primarily generic products have dominated the region. Within the last 10 years there has been a reduction in the number of food producing companies and an even greater reduction in food-sector employment, which accounts for 18% of employment in the region.[12]

Despite the reductions in companies and employees in the sector, the food cluster is considered to be very strong from an international perspective and it is among the best in Europe. Changes in the food industry and the region's focus on science and the development of human resources are the main explanations for the strong position.

At a time of reduced employment the Swedish and Danish food sectors have strong food export figures. In 2005, Swedish food exports were more than SEK 30 billion, and in 2006 the exports are likely to reach SEK 34 billion, 65 percent going to other EU countries. Since Sweden entered the EU in 1995 exports of foods to the EU have grown from SEK 4.6 billion to SEK 22 billion.

The increased exports represent a mix of Swedish and foreign produce. Many export products contain imported semiprocessed foods, but Sweden exports twice as much of these products as other EU countries. This helps Swedish farmers, who sell 70% of their raw materials to the food processing industry.

Similar trends are found in Denmark, where exports are up on previous years too, and where export of agricultural and food products is becoming more specialised. Of total food and agricultural products exports in 2005 (DKK 56 billion) 50.6% were value added products compared to bulk products. This is a trend that is likely to continue, and in 2010 it is expected to be 55% of total export revenue.

The transition from food industry to food science is supported by the location of specialised biotechnology companies including medical and pharmaceutical companies in the region and their participation in the cluster. It is estimated that around 300 companies, with 19,000 employees, are located in the Øresund region.[13] Of these 300 companies, 24 (10 on the Danish side and 14 on the Swedish side) focus on the so called green biotech business area (plants and foods).

[12] Center for regional og turismeforskning [Does this need to be translater?] 2005

[13] PLS Rambøll Management, 2003

The food cluster today has the following characteristics:

- 2,000 senior scientists
- 3,000 students
- Specialised research institutions
- 225,000 employees
- €48 billion turnover
- 60% of production is exported

Source: *Øresund Food Network*

As well as general universities and research and science institutions, the cluster includes specialised institutions representing high-end knowledge in food and biotechnology development. Veterinary and agriculture universities, technical universities, pharmaceutical schools, and research and science parks that foster incubators like IDEON in Lund and Symbion in Denmark, are examples of specialised research institutions. IDEON has leading expertise in functional foods, while Symbion has special knowledge in biotechnology.

The food cluster is strengthened by the presence of knowledge-intensive industries that supply food manufacturing, the most important being process and packaging technology and the ingredients and additives industry. A strong knowledge base in additives and ingredients based on biotechnology is central to the development of functional foods and contributes to value creation of the food industry in general. This sector is represented in the cluster by companies like Novozymes, Chr. Hansen, and Danisco.

Process technology includes solutions to sustain the production and development of products with special characteristics and effects. Producers of process technology and packing like Alfa Laval and Tetra Pack are also located in the food cluster.

Strengths and weaknesses of the Øresund food cluster [14]

Strengths of the Øresund food cluster are primarily related to the abovementioned characteristics of the science region with a highly skilled knowledge base, universities, and research institutions.

Other strengths include:

- A well developed infrastructure
- The Øresund Science Region as a world recognised brand, which supports the image of any single company in attracting customers, collaboration partners, and capital
- The Presence of many important sectors of the food industry
- Presence of associations to protect and promote the food sector
- Proximity among the agents in the food sector

[14] Based on interviews with Øresund Food network, Skåne Dairies, and PROBI AB

The weaknesses of the food cluster include:

- Differences between legal and administrative practices in Denmark and Sweden, which hampers the interaction between the Danish and Swedish workforces and the flow of knowledge and ideas
- Funds and investments are often tied to a certain country, which makes it difficult to establish R&D projects across the border
- Strong regulations
- Too many uncoordinated associations promoting the interests of the region and the food cluster

Strategy of the food cluster in the Øresund region

The strong global competition on generic food products has forced the food industry in the Øresunds region to promote and develop activities that favour the production of food products with special characteristics. The director of the R&D department of Skåne Dairies puts it this way:

> *We need to brand our products as something different in comparison to more generic products on the market. To do so we need to add special characteristics to our products.*

Cluster companies produce several types of specialised food products, including convenience food, organic food, and functional food, all of which have high annual growth rates ranging from 10–30%.[15]

Both the food companies and the research community pay special attention to functional foods because demand for them from consumers and governments is expected to grow in response to the increasing cost of health care and to lifestyle issues. The cluster also includes a range of world recognised biotechnology companies and science institutions, which is important for developing the innovations on which functional foods are based.

Consumers, too, are important for developing marketing strategies and identifying trends. The consumers in Scandinavia and the Øresund region are of special interest to the industry because they are critical, well-educated, and interested in health and the quality of food.[16]

Producing functional foods is believed to be important for positioning food companies in the market. The scientific and functional characteristics of the products are central to their marketing strategies, which implies that developing and producing functional food is based on continuous interaction among research, development, manufacturing, and marketing participants in the cluster.

Innovations and ideas used in food product development are often developed as part of broader concepts. That is, new food product ideas, how, where, and by whom the new foods should be consumed and marketed is developed as one overall project with several participating actors. This implies that the food product innovation process is organised in projects with simultaneous participation by companies and institutions rather than as a linear process. The proximity of participants in the cluster enhances the efficiency of project organisation.[17]

[15] Öresund Food Excellence: http://www.foodoresund.com

[16] Interview with Øresund Food Network

[17] Interview med Øresund Food Network and Skåne Dairies

One strategy in the Øresund food cluster is to add new functionality and characteristics to future food products and the mix of food-processing and other companies, research institutions, and knowledge centres in the region is making this a reality.

The Øresund Food Network

The ØFN was initiated as a Swedish-Danish network of researchers at IDEON, the science park in Lund. It started as a European development programme to support collaboration between member states in the EU. Today the ØFN is financed by the Danish and Swedish states and their regional governments together with the network members. It is a central objective that in future membership fees will cover more than half the running costs.

The ØFN, one of the six research and innovation platforms of the ØSR, is a central player in the food cluster and is an important mediator of knowledge sharing and collaboration between companies, universities, research institutions, organisations, and authorities in the food cluster. The ØFN participates in global research and development networks and contributes to the inflow of global knowledge on innovations in the food industry.

Food Innovation Network Europe (FINE) is an important network established by the ØFN in collaboration with eight other regional food actors. FINE's purpose is to share information on the European food industry and to increase European R&D investment.

The ØFN initiates activities that contribute value-adding knowledge to a broad range of company activities and processes in the whole food industry chain. Most of the activities address R&D in functional food to enable regional industry to benefit from current high growth rates, which are expected to continue.

Research undertaken in the network includes biotechnology to support the development of new and health-promoting products that are also environmentally sustainable. Six strategic research fields have been initiated:

- food safety and quality
- food and health
- food versus drugs
- food biology and biotechnology
- process technology
- logistics, distribution, and packaging.

The ØFN has so far contributed to intensified research collaboration between Sweden and Denmark. As just one outcome, in 2003–2005 the joint ØFN projects attracted research funds worth 16 million euro.

In addition, the network offers seminars, workshops, and seed money to develop research applications. For example, ØFN gives members free access to Reuters Global Business Insights and the reports on latest trends in food and beverage innovation, health trends, new product launches, and key market trends.

The members of the ØFN

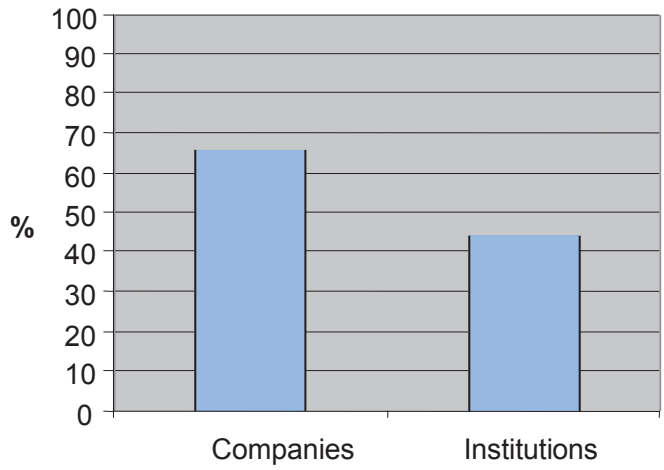
In 2005 the network became membership based, that is, companies and institutions pay for their membership. According to the managing director of the ØFN, Jörgen Holm, this has enhanced the quality and benefits of the network:

> *The fact that the members pay for their participation in the network does not lower the interest in participation in the network. On the contrary, the network has experienced a boom in membership interest. At the same time, members are more motivated to participate actively, which only strengthens the benefits of the network.*

More than 100 companies and institutions are now enrolled and the membership is steadily increasing. Figure 3 shows the distribution between private companies and institutions like universities, authorities, and organisations.

Figure 3: *Types of ØFN membership.*

Distribution of types of ØFN membership, 2005



Source: *ØFN*

The network combines private companies like Arla foods, Danisco Sugar, and small innovative companies like PROBI AB, with authorities such as the Danish Ministry of Agriculture, Food, and Consumer Affairs and research institutions like the Royal Veterinary and Agricultural University of Denmark. Most network companies are small with fewer than 20 employees but very big companies are also represented.

According to managing director Jörgen Holm, small and large companies enjoy different benefits from participation in the network. While small companies benefit from identifying partners and participating in collaboration projects initiated by the network, large companies more often benefit from easy access to new ideas and specialised knowledge, acquired by participation in seminars and workshops.

Again according to Jörgen Holm, the ØFN has a positive impact on the rest of the food cluster in the Øresund region because companies and institutions outside the network often participate in its projects.

In summary, ØFN, while still in a developing phase, plays a major role in facilitating collaboration and knowledge exchange as well as in attracting R&D funds. At the same time ØFN is becoming independent of public funds by attracting new members and increasing revenue from membership subscriptions.

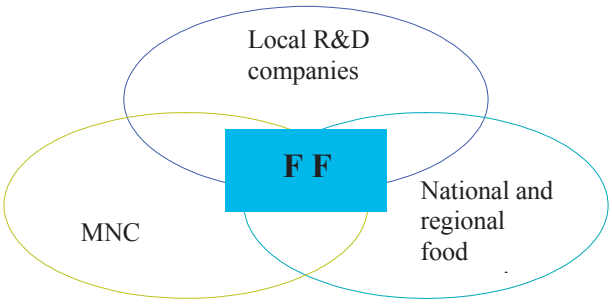
The dynamics of the food cluster

The food cluster of the Øresund region enjoys many common cluster advantages. The cluster hosts a specialised workforce and companies from important sub-sectors in the region's food industry. It also enjoys the advantages of a special setup of interacting and collaborating companies in formal and informal networks[18].

The cluster's main activity is developing and producing functional foods, and the many types of companies and institutions, each contributing its core competency and special characteristics are uniquely equipped to support this effort.

Figure 4 shows how the cluster agencies interact in developing functional food.

Figure 4: *Cooperation among companies and institutions to develop functional food (FF).*



Source: *Inspired by slide produced by ØFN.*

The national and regional food companies and suppliers have strong positions in the domestic markets and often supply raw materials further down the value chain. For example, Danisco supplies sugar and Skåne Dairies supplies milk.

Local research and development consultancy companies are most important in the transition from food industry to food science. The R&D consultants are often university spin-offs or enjoy close relations with universities. These companies offer knowledge on biotechnology and process technology to food companies that want to instill special and functional characteristics in their products.

The multinational companies and some regional and national food companies have access to sufficient financial resources to support research and provide access to customers through marketing and large distribution networks.

Being part of a cluster that gives access to the small specialised R&D companies is the best competitive option for the bigger food companies wishing to enter the functional food sector. The R&D companies provide the knowledge and ideas on which the food companies can develop products with special characteristics and effects. Hence, the co-location and the interaction among companies, universities, and the public authorities in the cluster give the food manufacturing companies a competitive advantage in the market for functional foods.

[18] interview with Øresund Food Network, Skåne Dairies

However, although the companies contribute to the development of knowledge-based products, those interviewed – the representatives of both the large company Skåne Dairies and the small biotechnology company – stress that they see the universities and science institutions as the key agents in the cluster, providing the critical base needed to create new knowledge and develop innovative solutions for the food industry.

Research in informal networks

In addition to ØFN, there are other formal and informal networks in the region. The formal networks are often established with partners outside the cluster, on a national or international basis, as European framework programmes.

Those interviewed emphasise the value of informal networks in adding value to products. According to Kenneth Anderson of Skåne Dairies, the informal networks are more cost effective and comprehensive in addressing real possibilities and unique solutions. The formal networks, on the other hand, are an important source of more general knowledge generated in a more rigid organisational framework.

The informal networks are often based on personal relations established in former workplaces or other collaboration projects. The mechanism of trust and the proximity of agents, which reduce opportunistic behaviour, are central aspects of the network. Kenneth Andersson describes it like this: 'You are invited to meetings and to participate in projects only if you make a contribution.' The proximity of companies and institutions enables cheap and continuous interaction among those with specialised competencies, which enhances the likelihood of developing new knowledge and good ideas. It allows companies to invite people from other companies and research institutions to informal discussions, which is not possible with people outside the cluster. Kenneth Andersson elaborates: 'You do not just invite a person from a firm in Stockholm to a chat for 30 minutes.'

The box shows an example of a research and development project that was initiated in 2006.

At Lund University a 10-year research programme was recently initiated, focusing on developing, assessing, and commercialising foods that contribute to counteracting age related diabetes and obesity. The background is the increase in lifestyle-related diseases in Sweden, Denmark, and the rest of the western world. Half the male population is overweight and 25% of the population shows early signs of diabetes. The research programme represents an investment of SEK 200 million and aims to develop new products and new production processes. The programme is called Anti Diabetic Food Centre (AFC) and will initially involve 38 researchers at the Technical University of Lund, institute for medicine and nature science.

The foundation of the AFC was laid by the government research funding council Vinnova, which supports technical research in areas that show growth potential. Vinnova will invest SEK 7 million a year in AFC. The university will invest the same amount and the last third of the investment will come from food companies participating in the programme. A lot of companies have already committed themselves to participation in AFC.

Source: *Lund University* **http://www.med.lu.se/nyheter/060620_antidiabeticfood**

The Øresund food cluster enables flexible organisational forms

Kenneth Andersson, now research director at Skåne Dairies but previously at Alfa Laval, and Jörgen Holm, now research director at ØFN but previously at Nestlé, point out that the change in food companies' activities from industry to science implies a change in the organisation of the food cluster and in the food companies.

Both men observe that the organisation of research activities in the big national and multinational companies is not optimally geared to capitalise on new knowledge and possibilities, which is essential to stay competitive. They describe the research departments of big multinational companies as being too large and rigid in their decision making process to

take quick advantage of new knowledge. Often the departments consist of highly specialised staff, who cannot digest the new available knowledge.

In the case of Skåne Dairies, ease of access to the expertise of small scientific companies has resulted in a downscaling of the company's own research activities so that now, it h The food cluster in the Øresund region as a smaller development team that only identifies new and available knowledge that can be adapted to the company's production.[19]

Kenneth Anderson stresses that companies must develop new methods to benefit from cluster advantages. Networking and meetings are often considered ineffective and peripheral to employees' job descriptions. In the cluster economy, such activities are essential to stay competitive and the companies must recognise this. In Skåne Dairies, networking and informal meetings are recognised as essential.

Companies as hubs in a chaotic cluster

According to Kenneth Andersson, innovation in food products happens more often in environments with few deterministic structures and a general acceptance of variation and failure than in those with very structured, systematic, and controlled innovation processes that often result in replicating the innovation strategies of other food companies:

> *It takes more than 100 ideas to develop one prototype and only two ideas will be discussed more than twice. But this is the game, if you want to survive…. To develop unique products you need a unique environment, and the Øresund food cluster represents such a unique chaotic environment.*

The chaos is made up of the agents from various research fields and company types and their more or less random and intense interactions, which create ideas and combinations hard for competitors outside the region to copy. Research results appear in the cluster, and subsequently it is the responsibility of each company to develop and cultivate the ideas into products through internal company systems and procedures, as described in the ProViva case in the next section. That case describes the processes of knowledge creation and development of functional food products, involving Skåne Dairies and the food cluster in the Øresund region.

Food companies + biotechnology companies = functional food products [20]

ProViva is a functional food product introduced by Skåne Dairies in 1994. Its sales have increased ever since and it has now developed into several sub-products under the same brand. In 2005 ProViva had worldwide sales of €57 million. ProViva is the result of collaboration among the competencies of researchers, big food companies, and small innovative biotechnology companies.

Innovation process

The development of the ProViva started as a purely medical project designed to develop bacteria to enhance patients' ability to benefit from the oat-based fluids they drank to recover after operations. The problem was that patients recovered slowly after successful operations because the antibiotics given to them reduced their ability to absorb the vitamins from the nutritional fluid.

[19] Interview with Kenneth Andersson

[20] Based on interviews with Skåne Dairies, PROBI AB and Ph.D. thesis, Functional Foods for added value by Cecilia Mark-Herbert, 2002

First, researchers from Lund Hospital and Lund University identified and solved the medical problem in the period 1986–1993, with support from regional and European investors linked to the pharmaceutical industry.

In 1991 the medical research information was gathered by PROBI AB, a company with the following characteristics:

- Biotechnology company specialising in research and development and commercialisation of bacteria with health supporting effects
- Founded in 1991 as a university spin-off
- 18 employees, located in IDEON, a science park close to Lund University
- Extensive collaboration projects with research companies and universities both outside and inside the Øresund region and big food companies like Skåne Dairies and Danone

Source: *Interview and company homepage:* **http://www.probi.com**

By 1991, PROBI AB had identified and cultivated bacteria that would serve the original purpose of the medical project, but some of the researchers realised that the potential applications for the bacteria were much wider. They identified food companies as potential customers for their product.

Kenneth Andersson of Skåne Dairies remembers that his former student colleague from Lund University and founder of PROBI AB contacted him by phone and asked if he was interested in meeting to discuss new development possibilities based on their medical product. He describes his early approach to the cooperation like this:

> *In the beginning I was not very interested in the project as such, but I was interested in the people in the research group. If they believed in this project then it had to hold some kind of potential.*

Skåne Dairies has the following characteristics:

- Develops, produces, and sells food products
- Founded in 1964
- 800 employees.
- Headquarters in Malmö.
- Four operational sites in southern Sweden
- Collaboration on R&D primarily with universities and small local research companies in the Øresund region

The outcome of the meeting was that PROBI FOOD AB was established as a subsidiary of PROBI AB with Skåne Dairies as part owner. Today, PROBI FOOD AB is inactive, but Skåne Dairies still owns 12% of PROBI AB.

The financial contribution of Skåne Dairies was limited but enough to enable research to go on. Even though the two companies collaborated from the start, Skåne Dairies' main contribution was in the later stages of developing and producing the final product when the company contributed sales and marketing competencies and partnerships, its large production capacity, and its distribution network.

In 1994, ProViva was launched as a joint project between Skåne Dairies and PROBI AB, produced and marketed by Skåne Dairies in Sweden and the UK. The product was Skåne Dairies' first in functional food. Between 1994 and 2000 sales of ProViva increased by 800% from 1,000 to 8,000 tonnes a year. In 2000, ProViva was further developed into a sports drink, ProViva Active, and later ProViva Shot was launched.

The functional characteristics of ProViva is based on the lactic bacteria Plantarum 299v, which was identified, isolated, and cultivated by PROBI FOOD, which also holds the patent on the discovery and use of the lactic bacteria. Skåne Dairies holds the rights to commercial applications of the patent.[21] The Skåne Dairies license includes the Nordic countries and the UK, while the French company, Danone, is licensed to use the lactic bacteria in its own products, for example, Actimel.

PROBI AB's general business model is to patent their bacteria innovations and then sell licenses to companies that use them in their products. Sales royalties are included in the license contract.[22]

The ProViva case is an example of the collaboration that takes place and is likely to continue in the Øresund food cluster. It is based on formal and informal networks facilitated by, among others, the ØFN and involves research institutes as well as large and small companies with complementary competencies.

Employment changes in the Øresund food sector

In Skåne, 1,395 food sector jobs have disappeared since 2001, a reduction of nine percent of the total food sector employment in that region.[23] Sweden's largest food sector companies are based in Skåne; therefore, this region experiences most of the total reduction in Swedish food sector jobs.

The general view is that these jobs are going out of Sweden to countries with low labour costs. In the opinion of the Swedish Union of Food Sector Workers (Livsmedelsarbetareförbundet, www.livs.se, which has more than 65,000 members) the retail sector with large players like ICA, COOP, and Axfood controls the market and is putting pressure on suppliers. Today, approximately 15% of the food production is sold under the private labels of retailers and wholesalers. The union expects this share to grow to 25–30% in a couple of years. To cut costs and stay competitive, most food manufacturing companies are left with no choice but to move their production to countries where the labour and/or raw material costs are lower.

However, not all companies are experiencing job reductions. Absolut Vodka in Åhus (wine and spirits) is the biggest exception, with large investments and expected increases in employment. But niche companies like Ugglarps slaughterhouse also go against the trend. Ugglarps expects to recruit new employees and invest in highly efficient production facilities in Malmö.

By comparison, one of Sweden's largest meat processing companies, Swedish Meats, is set to transfer production to Poland. Swedish Meats has conducted an analysis that suggests that it would make sense to close down half of its production facilities in Sweden, including two facilities in Kävlinge and Skurup (Skåne).

[21] interview with Kenneth Andersson

[22] PROBI Annual Report 2005

[23] Source: Livsmedelsarbetareförbundet – **http://www.livs.se**

The reduction in EU quotas is putting pressure on the price of sugar and forcing Danisco to close its sugar distillery in Köpingebro and an office in Arlöv after the next campaign.

As well as the bitter consequences of restructuring there are also positive outcomes. The food sector, which for a long time was protected by import restrictions, has come to life. More liberal market conditions and tougher buyers in the continuously growing and merging retail and wholesale groups force price reductions and have increased efficiency in the Swedish and Danish food sectors.

At the bakery company Pågen in Malmö, management and employees have increased efficiency by 40 % since 2000. The company concentrates on achieving the most efficient production and focuses its marketing and sales on just one brand, with the aim of increasing exports.

Findus, with its main office in Malmö and a large production facility in Bjuv, has turned a loss into a small surplus and is looking positively towards the future. The company has invested heavily in an efficient production facility that gives it the necessary capacity without adding employees.

In Procordia Food, efficiency at the production facility in Eslöv doubled in 2005. Furthermore, the company managed to increase its innovative capacity and introduced new products and new production methods. Helene Giertz, Procordia Food, said that, 'Since 2002 we have increased our innovation rate by 400 % even though we have decreased staff levels.

The food and drink sector on the Danish side of Øresund, in contrast to the Swedish side, has had only minor restructuring. One example is Carlsberg closing its Valby brewery which will mean the loss of 240 jobs by 2008. However, several smaller niche breweries have emerged and grown to where they are beginning to recruit employees. Examples include Brøckhouse with 11 employees and Herslev Bryghus with 15. But most of the food-related companies in the Copenhagen and surrounding areas do R&D and other less labour intensive activities so this part of the region is less prone to the type of restructuring that happens in labour intensive parts of the sector.

According to the Danish Food and Allied Worker's Union,[24] most large Danish food processing companies are based in the western regions of Denmark (Funen and Jutland) where the agricultural sector is also strong, and in these areas, employment has been affected by restructuring. This is the case within large companies like Danish Crown, Arla, and Danisco, which all are in the process of outsourcing and/or closing down production facilities.

Nearer Copenhagen, green biotechnology companies like Christian Hansen, Danisco, and Carlsberg are the largest employers. However, Danisco is integrating its Swedish and Danish administrations which will affect employment primarily in Sweden, but the plant closure on the Danish side will take place in Funen (Assens), not in the Øresund region.

The job services on both sides of the Øresund have agreed to collaborate in order to achieve mobility of food sector and other workers between the two. They jointly monitor the state of the labour market on each side to identify potential shortages and surpluses that can be eliminated by stimulating labour transfer from the Swedish to the Danish side and vice versa. So far there has not been much need to transfer workers in either direction, but the need might arise in future.

[24] Danish Food and Allied Workers' Union which has approximately 36,000 members

The ØFN does not facilitate recruitment and employment activities. These are conducted by the public job services and the private recruitment agencies.

The conclusion in terms of the Øresund employment market is that on the Skåne side, according to the union **http://www.livs.se**, another 1,600 jobs could be at risk, whereas on the Copenhagen side significantly fewer jobs are at risk because more of the current jobs are already skilled and higher skilled jobs. Even so, research from the RAR biotechnology study suggests that in future workers in the food and related sectors must be better educated and more competent on both sides of the Øresund.

Increased effectiveness and production efficiency, and especially product and process innovation, are needed for the Swedish and Danish food and drink sectors to stay competitive with other European and worldwide food and drink processing companies, and this requires highly skilled employees.

Changes in demand for competencies

The development of the food cluster reflects developments in the Danish and Swedish food industry in general. Closing down or automating production sites and focusing on value-adding processes in research intensive activities with biotechnology companies has changed the geographical location of jobs and created a demand for new competencies in food cluster companies.

In Skåne Dairies the change to producing unique products by adding value has also resulted in a change in the demand for competencies. The new demand is met partly by collaborating and interacting with biotechnology companies and by upgrading employee skills.

Skåne Dairies has met the demand for change by upgrading their production workers' skills and by employing staff with other competency profiles. Previously most Skåne Dairies employees had a general high school certificate and were trained on the job by the company. Those few with further education were often dairymen. Skåne Dairies has now reduced the number of workers with lower educational backgrounds.

Today Skåne Dairies employs graduates like fully qualified engineers to collaborate with biotechnology companies and enable the integration of new knowledge in the company's processes. The company also hires more economists to address product development as a concept, not just as an isolated innovation adding value to products.[25]

Upgrading the workforce skills

To upgrade the skills of the rest of the workforce, Skåne Dairies used the net-based education programme, MENY, offered by the Knowledge Foundation of Sweden and supported by the Swedish state. The general objective of the foundation is to develop the competencies and knowledge base of Swedish companies, primarily by supporting the use of ICT, and to bridge the worlds of research and business.

[25] Interview with Skåne Dairies

MENY is a cooperation between universities and colleges that is supported by the Knowledge Foundation. The objective of the initiative is to support interaction among research and education institutions, food companies, and biotechnology companies. The programme consists of following activities:

- internet based education programmes
- mentor programmes
- MENY circles

The internet-based education programmes are tailored to companies' needs and topics vary from hygiene issues to process technology and the relations between consumers and functional food development. The courses run for a maximum of five weeks and are often given by experts from universities and colleges. Participants can combine work and study without too much disturbance.

The mentor programmes support relationships between companies and researchers by building company teams that are guided and inspired by researchers and experts in areas like food science, biotechnology, organisational development, and/or leadership.

The MENY circles are designed to support companies' growth potential. Circles are set up by companies and researchers to solve concrete common problems. Process consultants from MENY help to define the problems and to find and implement solutions by introducing researchers to the circles. Thirty circles have already been conducted and 13 are currently running.

The feedback from companies that participated in the MENY programmes is very positive and ØFN considers developing the concept to offer MENY services to the Danish food industry tool.[26] Students from Danish food companies could join the MENY internet-based education programme and, where necessary, collaborations with Danish mentors and educational institutions would be established.

Competencies of biotechnology companies

Biotechnology companies have competencies essential to the development of food products, such as functional foods, with special characteristics. These companies contribute to the identification, cultivation, and development of additives and ingredients to the food products.

The biotechnology company employees typically have degrees in medicine, microbiology, or chemistry or have technical, pharmaceutical or nutritional backgrounds. Skills in business, concept development, and marketing are also important. These types of competencies are needed for organising R&D projects with research institutions and other companies and for patenting, but also as a result of the position of the biotech companies in the food cluster.

A central contribution of the biotechnology companies is to bridge the worlds of science and food producers. PROBI AB representatives put it like this:[27]

> *Our firm represents a broad range of competencies within the field of biotech. This lets us define the needs of food companies and identify the possibilities of the research institutions.*

[26] The organisation, objectives, and initiatives of MENY is further described at their home page: **http://www.meny.se**

[27] Interview with Kenneth Andersson, Skåne Dairies and representatives from PROBI AB

The PROBI AB representatives say that they have regular contact with agents from food companies and research institutions inside and outside the food cluster in the Øresund region so that they can identify possibilities and needs in the food industry. Knowledge and understanding is acquired through meetings, just as information from reports, scientific articles, and participation in networks like ØFN add to the company's general knowledge base.

PROBI AB participates in research projects with several universities and research institutions all over the world to develop the right type of bacteria for potential future products in the global food industry. That way PROBI AB can provide global specialised knowledge to companies in the Øresund region food cluster. .

The biotechnology companies are central to the transition of the food cluster from food industry to food science and the production of functional food. The combination of competencies represented by the food companies and the biotechnology companies, respectively, contribute to successful development, production, and marketing of functional food products. Table 3 shows the key competencies of the two industry sectors.

Table 3: *Key competencies and resources of food companies and biotechnology companies in functional food production*

Food companies	Biotechnology companies
• Suppliers of raw materials • Production capacities • Close relations with consumers • Brands • Distribution networks • Capital • Marketing facilities • Distribution networks	• Skills to develop ingredients and additives to put special characteristics into food products • Skills to develop business plans and concepts around innovative features of food products • Close relations and collaboration with research communities and universities • Testing facilities • Small and flexible organisations

Companies that were asked for their future requirements in competency development and strengthening pointed to the need to upgrade of the business skills of employees with a science background, for example, microbiologists or pharmacists. They also suggested that even more biotechnology companies conducting an even broader set of activities be located in the cluster.[28]

Jobs in the food and green biotechnology sectors are generally becoming more knowledge intensive. It is expected that in future all jobs will require further or higher education and training and regular upgrading of knowledge and skills. The manual jobs are disappearing because of increased automation in production and because production plants have moved to low labour-cost markets.

Conclusion

The characteristics of the food cluster in the Øresund region today are a result of the general transition of the food industry and the political strategy of the Danish and Swedish governments. The two governments have a vision of a One Øresund region built on science-based knowledge and competencies, and supporting and developing the strengths of existing biotechnology and food industries.

[28] Interview Øresund Food Network and PROBI AB.

This requires that the food industry be able to benefit from the high global growth rates of food products with special characteristics. Functional food is a central category of this type and it is a dominant element in the strategies of both food and biotechnology companies and the food cluster in general.

The food cluster in the Øresund region includes most of the important sectors of the food industry. In relation to functional food, biotechnology companies play a crucial role. They contribute key competencies to add characteristics and value to food products, allowing the food companies to differentiate themselves from companies producing more generic products.

In addition, companies benefit from general cluster advantages like a specialised workforce, proximity to research and development institutions, and networking possibilities.

Physical proximity between players in the different informal and formal networks has a positive influence on innovation. The unstructured and chaotic interaction of players in the cluster creates an environment where ideas are easily developed and shared. The apparent lack of structure conceals a unique system hard for competitors to copy.

The presence of many small science-based biotechnology companies reduces the need for food companies to maintain their own research departments because they can access global specialised knowledge in the cluster, which can adapt to changes faster than big internal R&D departments.

Representatives from both food and biotechnology companies emphasise the role of the universities and other research institutions. The universities and research institutions are defined as the key agents in the cluster and they provide access to a highly educated workforce and to new and specialised knowledge and innovations.

The main present and future challenge of the Øresund food cluster relates to the fact that the region encompasses two countries and hence two national legal and administrative systems. This means that players in the cluster must tackle the interaction and possibly conflict between two tax systems, two sets of labour market regulations, etc. This restrains interaction between the two nations in the region in general, and in particular lots of red tape has to be faced when Danish companies want to employ Swedish workers or vice versa. Often investment and access to funding is tied to one country and hard to implement or transfer in transnational projects across the cluster and the border.

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Source list

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Jörgen Holm, director of development, Øresund Food Network, 17 Marts 2006

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