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Connection of Food system and the Baltic Sea
- operators perspectives to key problems and solution ideas

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Degree Programme in
Business Management
Bachelor's Thesis
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Laurea University of Applied Sciences **Abstract**
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Connection of Food system and the Baltic Sea
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The aim of the thesis is to identify key problems in the food production chain related to the Baltic Sea and how operators in the chain experience them. In addition, the thesis offers ideas on how to solve the key problems. The actors are corporate, public, education and civil operators. Consumers are not included in the study.

The status of the Baltic Sea is not sustainable. Even though a wide range of research, action plans and observation have been done, more actions are still needed. Eutrophication is one of the key problems of the Baltic Sea. The largest eutrophicator is the agriculture.

The study was carried out as a part of the project: FuturesLab CoFi Laurea, Tulevaisuuden vesiliiketoiminta – vesi nyt ja tulevaisuudessa (Kehä-hanke EAKR 9/2016-8/2018). The project concentrates on the Uusimaa region in South-Finland. The study gathered background information of the current status of the Baltic Sea and the water bodies. In addition, the current situation of the Finnish food sector is introduced.

Data was collected with twenty-six interviews. The data was then analysed to identify the main themes of the key problems and solutions. Fifty key problems and forty-five solutions were found. The analysis showed that there were differences between actor groups on their thoughts about the key problems. However, only a few differences were statistically significant. The key problems, which emerge the most, are: 'weaknesses of the knowledge', 'the information distribution weaknesses', 'long-term actions lacking', 'lack of co-operation', and 'the balance of the economical, ecological and social sides'. The most common ideas for solutions are: 'increased co-operation', 'concrete measures and actions', 'political control in the direction of sustainability', and 'new research and innovations'.

A Future Workshop was organised and the basis for it was the findings from the interviews. It was possible to look deeper into the subject in the Future Workshop. The discussions resulted into some new ideas.

The thesis gathered thoughts of this wide topic on the food production chain and sustainability from different actor groups. It was thus possible to compare the groups' ideas about key problems and solutions. The findings in this study were in line with other studies. The results should be taken into account especially at the administrative level. The food system should be renewed and developed more sustainable at all levels. The study indicates that desire for a more sustainable Baltic Sea can be found, but actions and information about distribution are needed.

Keywords: Food production, The Baltic Sea, Sustainability, Key problems, Solution ideas

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Terminology

Culture of sustainability	Sustainable development is development that meets the needs of the present without compromising the ability of Future generations to meet their own needs (WCED 1987). The culture of sustainability tries to keep sustainability aspects in every actions.
Diffuse pollution	The emissions that come from agriculture and forestry, rural settlements, as well as from the air. These emissions come from a variety of sources, and are spread over a large area (Peda.net 2016).
Direct point sources of pollution	Refers to those who are directly draining their waste water from municipal and industrial wastewater treatment plants, as well as fish farms situated in the sea areas into watercourses (SYKE 2016a).
The circular economy	In the circular economy, resources are retained in the economy even when the product has reached its end of life. The aim is to design and manufacture the products in principle, so that they remain in use and run as long as possible (Ministry of the Environment 2017).
Ecological status of the water	Ministry of the Environment & Finnish Environment Institute 2013: the assessment of ecological status primarily looks at biological quality. The conditions in water bodies concerning plankton algae, diatoms, aquatic plants, benthic fauna and fish is compared to conditions where human activity has not caused discernible effects in flora and fauna. The lower the human effects, the better the ecological status of a water body. The assessment also considers the chemical quality (total nutrient load, pH, visibility) and hydromorphological factors (such as obstacles to migration, regulation) of the water body.

Eutrophication

Eutrophication refers to the main plant nutrients, nitrogen and phosphorus, accumulation in the aquatic environment as a result of human activity. Organisms that can tolerate high nutrient levels and turbidity become more abundant than the others. Especially the coastal and aquatic vegetation and phytoplankton will increase and fish fauna decrease as well as the bottoms of oxygen depletion (Nixon, 1995, Business dictionary 2017, Peda.net 2017, WWF 2016, SYKE 2016b).

Food production chain or Food system

The processes that describe how food from a farm ends up on our tables. The processes include production, processing, distribution, consumption and disposal. Working actors in the processes: 1. Farm and input industry 2. Industry 3. Retail and catering 4. Consumer 5. Disposal and waste management (Finnish Food Industry Statistics 2016).

Future Workshop

Future Workshop is one kind of research method which is well suited for teaching of the Future thinking. In practice, the method is used so that one theme is chosen to discuss. Through these theme discussions possible Future paths and visions are sketched. The method is made for shared visioning and auctioning to find solutions and visions for the Future, it is very participative and interactive method (Jungk & Müllert 1987).

Surface waters

Ministry of the Environment & Finnish Environment Institute 2013: a separate and significant part of surface waters, such as a lake, reservoir, stream, river or channel, a part of a stream, river or channel or part of a coastal waterway.

Sustainable food production

Eco-functional Intensification in the food production, meaning as a more detailed consideration of the environmental and ecological concerns. A sustainable food system is a collaborative network that integrates several components in order to enhance a community's environmental, economic and social well-being. Including e.g. emphasis on the environmental effects, the quality of food, the development of organic regulations, sustainable plant and animal breeding, the development of nutrients to effectively exploit varieties as well as new innovations and food security (Luomuinstituutti 2015).

Vision

Visions of the Future and the method of envisioning are common approaches for making claims about and for the Future. Everyone can have an own vision, and we also expect certain people (mostly leaders) to have vision. Most Futures practitioners confirm that a (shared) vision is needed for successful action, and the active development of vision is therefore to be encouraged (van der Helm 2008).

1 Introduction

1.1 Background

It is well-known that the state of the Baltic Sea has been weak already for decades. There are several different aspects that are making water quality poor in the Baltic Sea. The main problem is eutrophication (Finnish Environment Institute 2016, Ministry of the Environment & Finnish Environment Institute 2013). Recovery of submerged vegetation following nutrient reduction is a very slow process, which involves the replacement of fast-growing for slow-growing plants (Duarte 1995). Eutrophication is affecting to the whole ecosystem of the Baltic Sea. The problem have been studied a lot and many processes have been done for the better quality of the Baltic Sea. The Baltic Sea is one of world's most sensitive inland seas (Finnish Environment Institute 2016, Ministry of the Environment & Finnish Environment Institute 2013).

The Baltic Sea is small but important sea. Nine countries are around the sea in the sea catchment area: Finland, Sweden, Russia, Estonia, Denmark, Latvia, Lithuania, Poland and Germany and it also includes parts from five other countries: The Czech Republic, Slovenia, Ukraine, Belarus and Norway (Furman et al. 2014). The Baltic Sea is the world's largest brackish water basin. Baltic Sea covers an area of 422 000 km² and an average depth of 56 meters. The Atlantic Ocean and the Baltic Sea are connected via narrow and shallow Danish straits (Meriliitto 2017). The Baltic Sea is a shallow inland sea, with a wide water catchment area. This water catchment area is home to tens of millions of people, and there are a lot of industries (Peda.net 2016).

The countries around the Baltic Sea have different backgrounds of history, politics and socio-economics. That has effects to environmental problems, e.g. eutrophication and how these problems are managed. The countries are surrering diffently from the effects of the eutrophication and they are concerning about the problem differently. Different kinds of motivations to protect the Baltic Sea can be interpreted by geopolitical differentiations. Also politics and regulations concerning about the Baltic Sea vary between countries (Pihlajamäki & Tynkkynen 2011a).

Today studies can show that the biggest eutrophicating factor is food production and the whole food system has a big role (figure 1). Nutrition leaks from food production affects to the Baltic Sea in a sense of eutrophication. Agriculture is the single most important source of nutrients and eutrophication in the Baltic Sea (Larsson & Granstedt 2010, Granstedt et al. 2008, Iital et al. 2010 and Wulff et al. 2001). Agriculture has a significant effect to the water ecosystems including ditches, streams, inland waters and the Baltic Sea. Fields in Finland are distributed unevenly between different geographical locations. About a hundred km wide coastal zone of arable land has an average of almost a third of the land area, often even larger percentage. Inland, while arable land is little more than a dozen, and in the north up to less than five per cent of the land area (Tiainen et al. 2004, Stoate et al. 2009, SYKE 2016a).

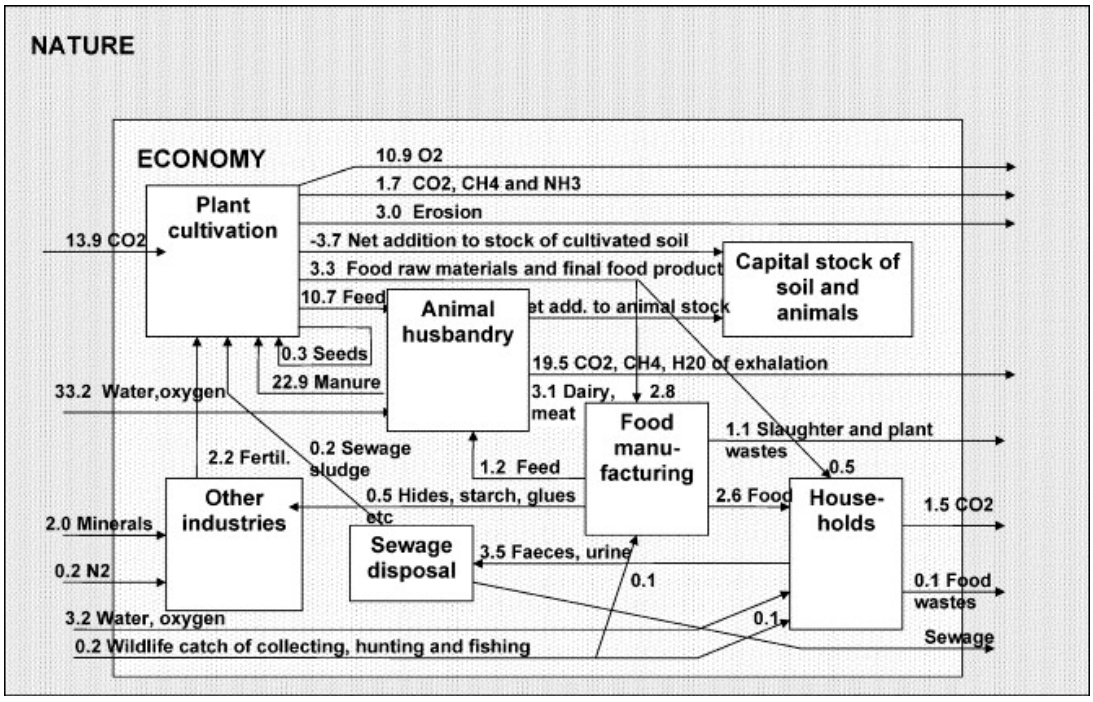

Figure 1: Material flows of the food flux in Finland, thousand metric tons (Risku-Norja & Mäenpää 2006).

This study focuses on the primary production and the beginning of the food production cycle because those have the most significant effect on the water systems. However, the other parts of the food system must also be taken into consideration in order to provide the big picture of the process.

The main cause of eutrophication nutrients are nitrogen (N) and phosphorus (P). Nitrogen and phosphorus are the main limiting elements of the growth of organisms (WWF 2016, Pietiläinen et al. 2008). For that reason, this study is focusing on the two most relevant nutrients: nitrogen and phosphorus. There are also other nutrients that are affecting to the euthrophication, e.g. potassium (K) and magnesium (Mg) but those are not normally the limiting nutrients for the organisms growing (Havlin et al. 1999).

It is possible to have culture of sustainability to maintain many of these problems. Solving these problems e.g. co-operation, new technologies, economical adds are needed. It is important to view this complex subject in a scope of all there dimensions: Economic, Ecologic and Social dimensions (Figure 2.) Society and culture includes aspects of nutrition, health, traditions, customs, access, equity and sovereignty. Environment has categories of atmosphere, biodiversity, water and soil. All those subcategories have an important role in a food system. Categories are making also together ecosystem services, demand supplies, rural viability and landscapes (IAASTD 2009, Risku-Norja 2011).

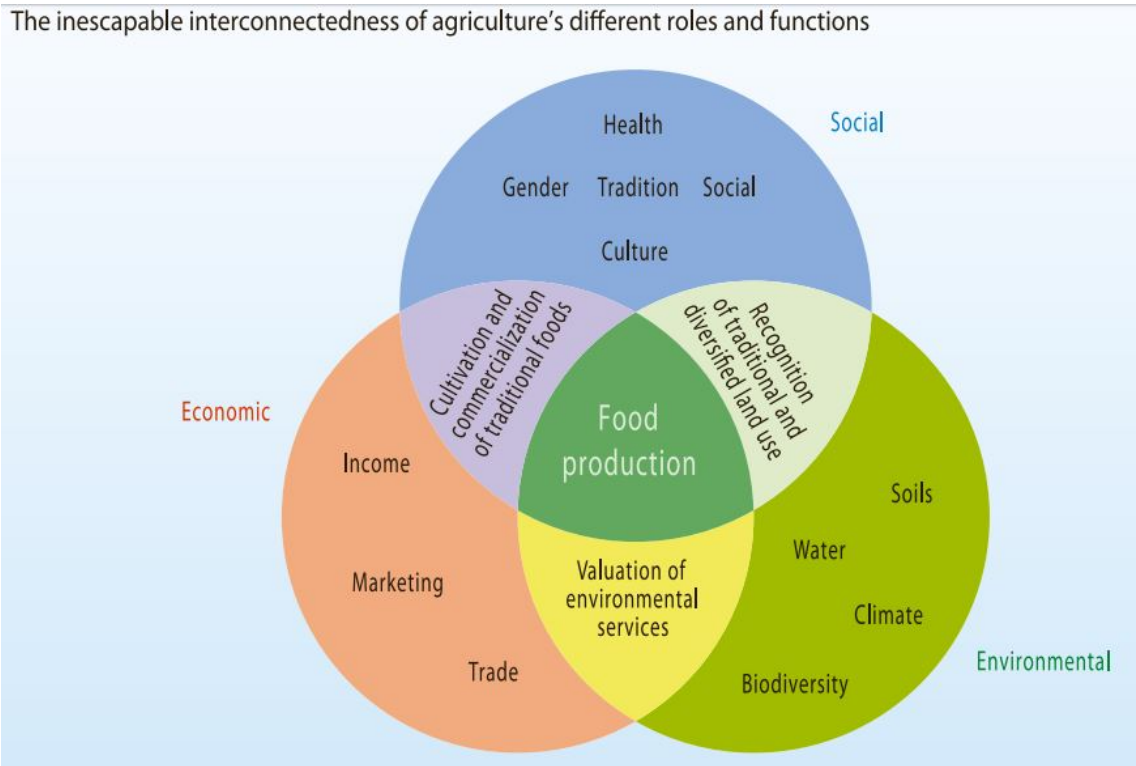

Figure 2: A multifunctional perspective of agriculture. Social and cultural, economic and environmental aspects are together affecting to food system (IAASTD 2009)

This thesis is part of the project: FuturesLab CoFi Laurea, Tulevaisuuden vesiliiketoiminta – vesi nyt ja tulevaisuudessa (Kehä-hanke EAKR 9/2016-8/2018).

The project consentrates on the geographical area Uusimaa in South-Finland. The area was chosen because the water on the coast there has the poorest ecological status in the Baltic Sea. Chapter two discusses this topic in more detail.

1.2 The aim and structure of the thesis

The aim of the thesis is to identify key problems in the food production chain related to the Baltic Sea and how they are experienced by operators in the chain. In addition the thesis offers ideas on how to solve the key problems. The actors are corporate, public, education and civil operators.

The thesis:
- helps to analyse and define the state of the Baltic Sea caused by the food production
- reveals how much the opereators know about sustainability in a context of food and the Baltic Sea, and how they think the subject is known in general
- makes visible how representatives from various fields in the food system see the topic of the thesis.

The study begins by describing the current status of the Baltic Sea. This will give background information forming the base for the study. The third chapter provides information of methods used to gather and analyze the found information and how these methods are implemented in the study. The next chapter analyzes the interviews deeper. The interviews are first categorized according to themes and then combined into larger clusters.

The fifth chapter describes a Future Workshop which searched of innovative solutions for the identified key problems. The sixth chapter reflects the results of this study to other studies in research, politics, economics and in media. The final chapter presents the conclusion and suggestions for development. Table 1 demonstrates the basic structure of the thesis.

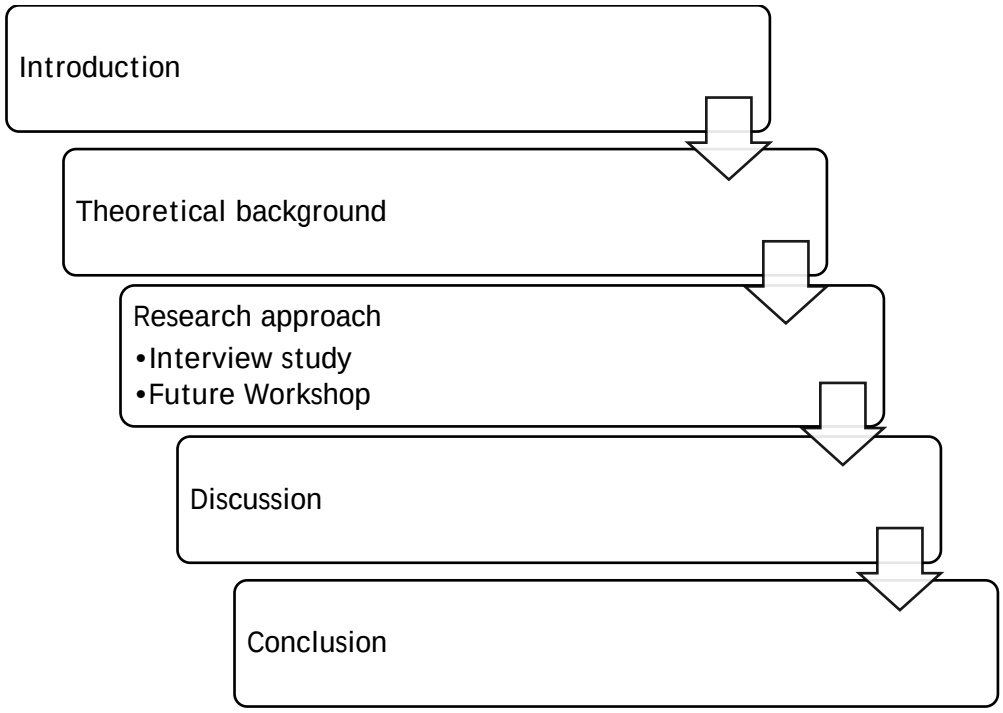

Table 1: Framework of the thesis

2 Description of the current state of the Baltic Sea and the food system in Finland

2.1 Description of the current state of the Baltic Sea and water bodies

The ecological status of Finland's waters is in the 85% of the surface area of our lakes and 65% of our rivers is in a good or very good state. However, three-quarters of the surface area of our coastal waters are in a worse state. The main problem is eutrophication (Ministry of the Environment & Finnish Environment Institute 2013).

Agriculture is causing solid matter and nutrients load that is biologically, chemically and physically overloading water environments (Tiainen et al. 2004, Stoate et al. 2009, SYKE 2016a).

Signals of the eutrophication of the water are: fish nets and coastal stones get slimy, increase the amount of algae and algal blooms, a change in water colour and visual depth decrease, hydro plant abundance and changes in species, changes in the number and species of waterfowl, changes in the fisheries: (valuable fish catches are reduced, roach fish more abundant, fish deaths), odour nuisance and water users' health hazards: (bathers skin rashes and swimmer's itch, animal poisoning caused by drinking contaminated water) (SYKE 2016b).

The Nitrates directive in Finland classifies that the whole area of Finland is nitrate sensitive area (TEXTE 95/2015). During the reporting period 2012-2015 annual average nitrate concentrations did not exceed the limit set by the Nitrates value (25 mg / l). The limit value was not exceeded in any river, lake or coastal water. However, the single maximum nitrate levels exceeding were found in nine southern and south-western rivers. Although concentrations were below the limit values, both nitrate and nitrogen have a major role in the eutrophication of surface waters (SYKE 2017) the map of figure 10 is showing the nitrogen and phosphorus pollution points.

Most of the phosphorus loads caused from human activities are transported to the Baltic Sea along with river water. The annual average of 3 900 tons of phosphorus per year to the Baltic Sea in years 2008 - 2012 was 95% transported by rivers and 5% as a direct point load. The direct point phosphorus load has decreased by more than 70% from the comparison year 1990 level. Finland has 10% of all phosphorus loads in the Baltic Sea from the all countries around the Baltic Sea (SYKE 2016a).

Maps of figures 3-9 are showing the state of the Gulf of Finland in the Baltic sea and the inland waters of South-Finland and Uusimaa, Finland (SYKE 2013). Map of figure 11 shows the atmospheric deposition of oxidized, reduced and total nitrogen to nine sub-basins of the Baltic Sea for the period 1995 – 2014 (Bartnicki & Benedictow 2016). The map has statistic for the Gulf of Finland about the atmospheric nitrogen. The amounts has been degreasing from 18 ktonnes N/year in 1995 to 14 ktonnes N/year in 2014. The degreasing amount of ktonnes N is 22 %. It shows that the actions have become more sustainable during these 20 years. Still comparing to the maps of figures 3-9 we can see that there is still a lot to make.

The map of Finland in figure 3 shows the status of the surface waters. The poorest state of the surface waters exists in the coastal zone of Finland. South coast of Finland has also poor water bodies in the seaside when in the other parts of the coastal zone, the poorest parts are

in the rivers and the seaside is clearer. Uusimaa is part of the South Finland and it is part of the poorest zone. The sea waters of Uusimaa are in poor condition. Maps in figures 4-9 are showing the state of the waters in Uusimaa. Figure 12 shows the distribution of the pollution caused by different kinds of industries. The biggest polluter in all sea sides of Finland is the agriculture (SYKE 2016a).

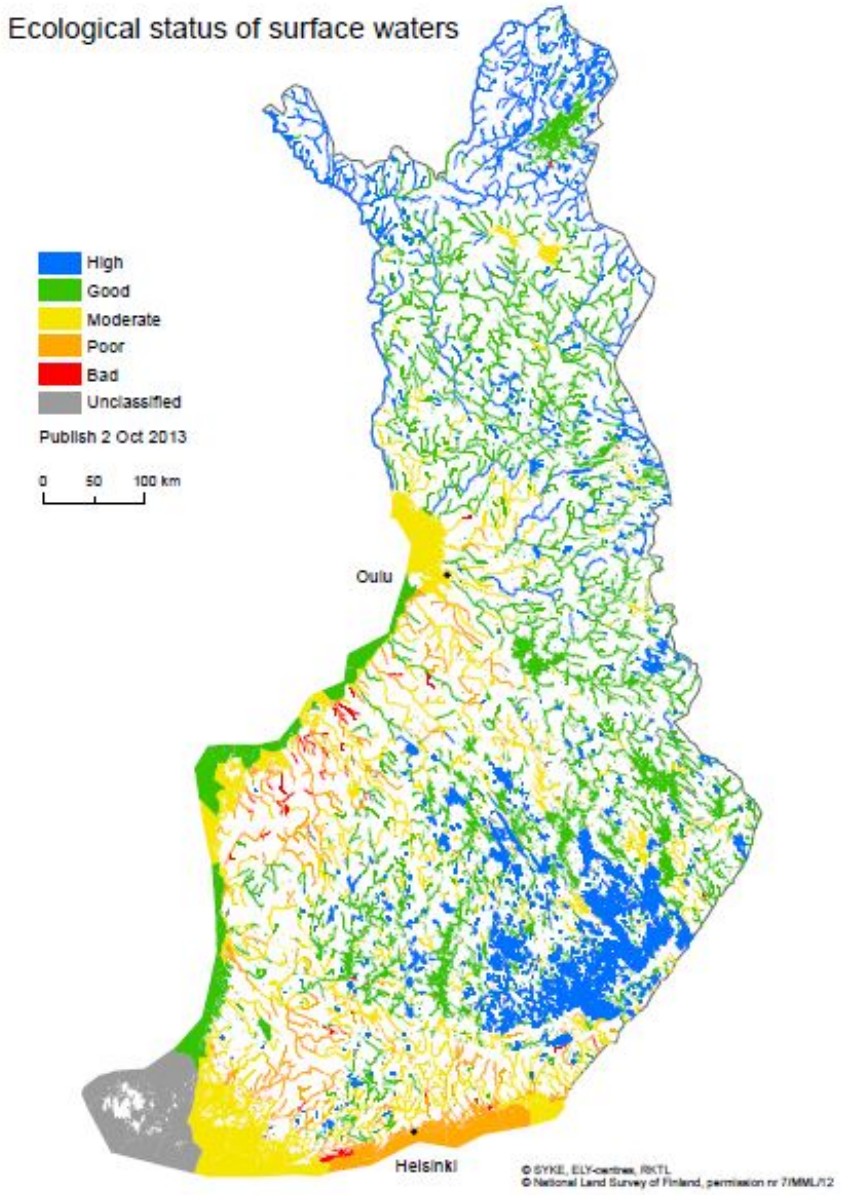

Figure 3: Map of the ecological status of the surface water in Finland. SYKE, ELY Centers and Finnish Game and Fisheries Research Institute. 2013. Map: National Land Survey of Finland, permit number 7/MML/12 (SYKE 2013).

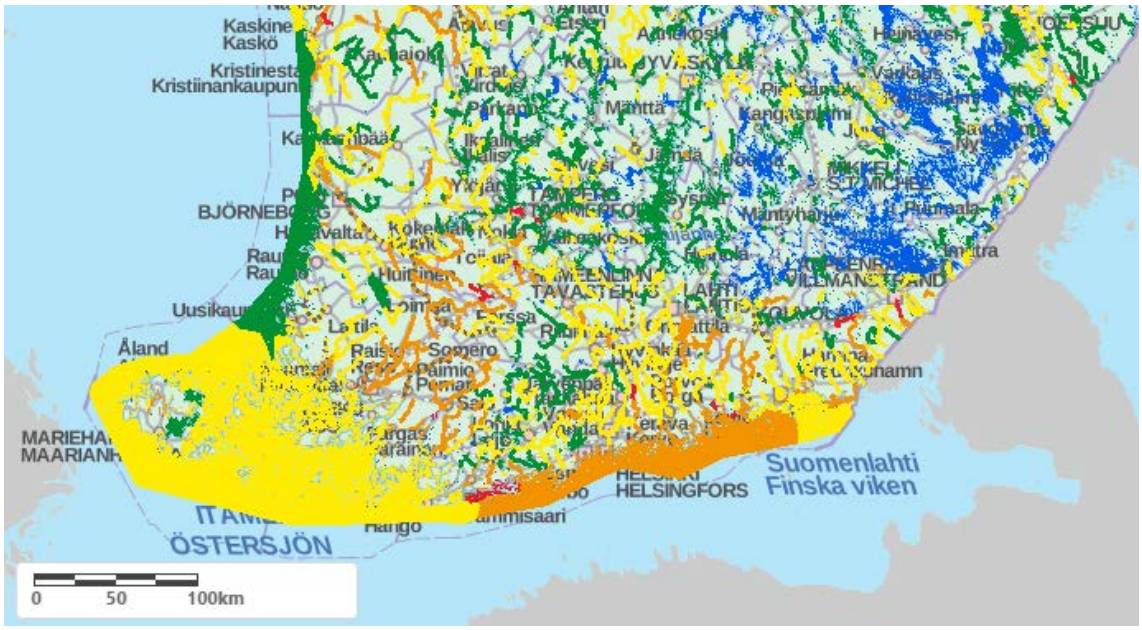

Figure 4: The state of the water bodies in South Finland (SYKE 2013). The colors show the status and the colors are coded to best to worse as: Blue> Green> Yellow> Orange> Red.

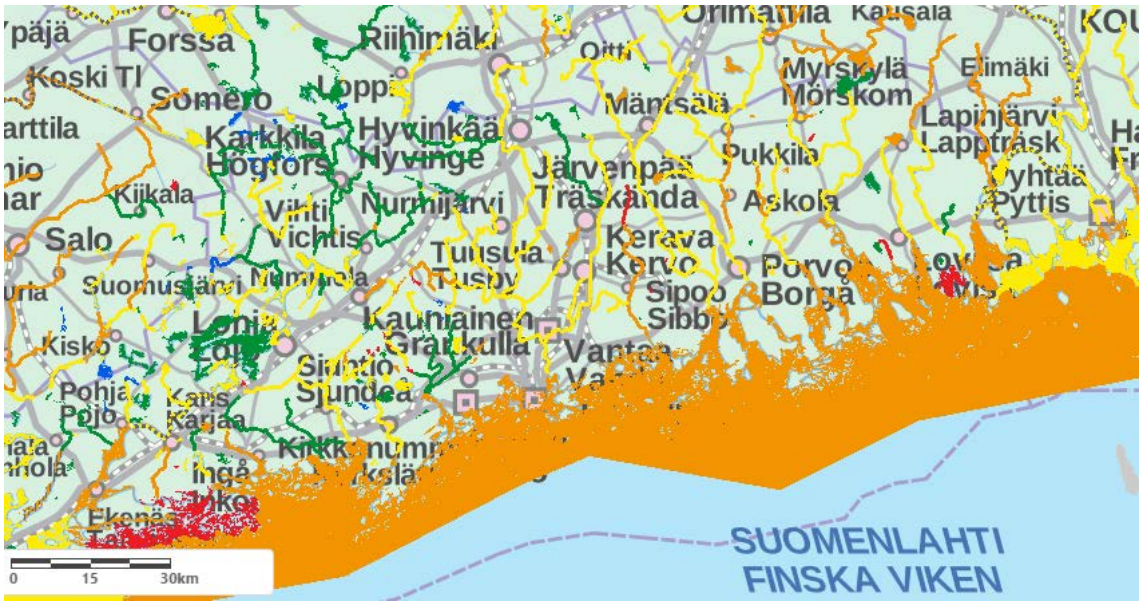

Figure 5: The status of the water bodies in Uusimaa, Finland (SYKE 2013) The colors show the status (Blue> Green> Yellow> Orange> Red).

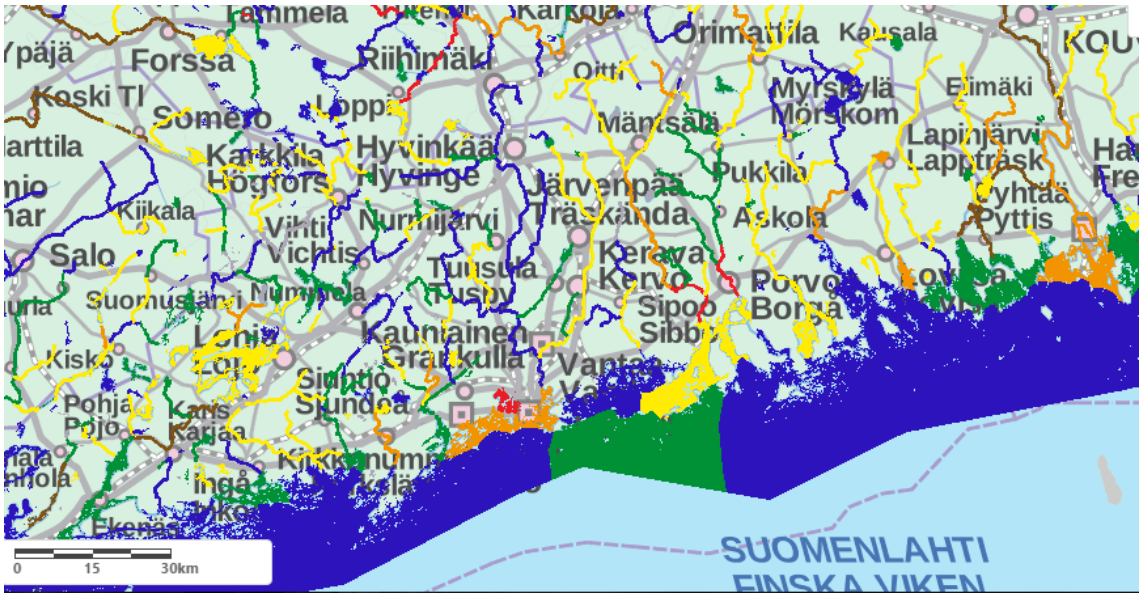

Figure 6: Hydrological morphological changes in the water bodies of Uusimaa, Finland (SYKE 2013) The colors show the status and the colors are coded to best to worse as: Blue> Green> Yellow> Orange> Red.

Figure 7: Diffuse pollution status of Uusimaa, Finland in years 2000-2011 by VEMALA (SYKE 2013). The darker the color the more there is diffuse pollution.

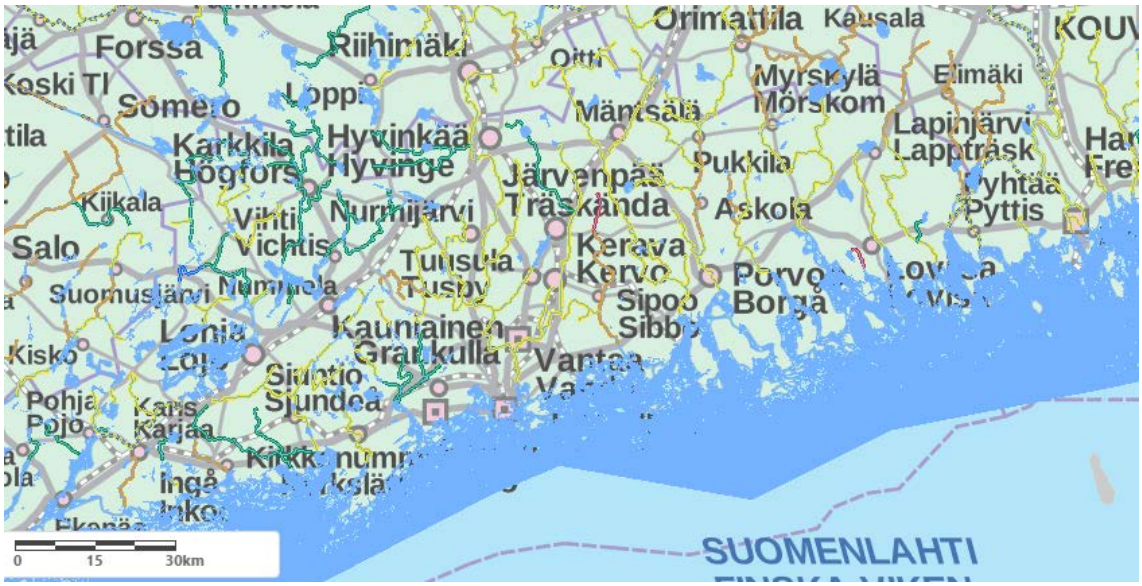

Figure 8: The status of the surface water in Uusimaa, Finland (SYKE 2013) The colors show the status (Blue> Green> Yellow> Orange> Red9.

Figure 9: The groundwater status and risk-areas in Uusimaa, Finland (SYKE 2013). The colors show the status (Green: good, Red: bad and Greyish blue: risk).

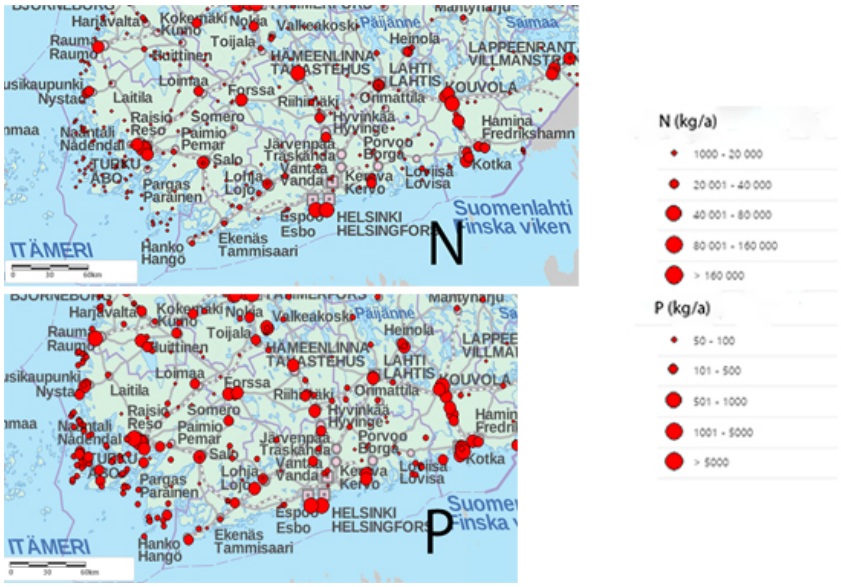

Figure 10: Nitrogen (N) and phosphorus (P) point sources of pollution in years 2006-2012 in South Finland (SYKE 2013).

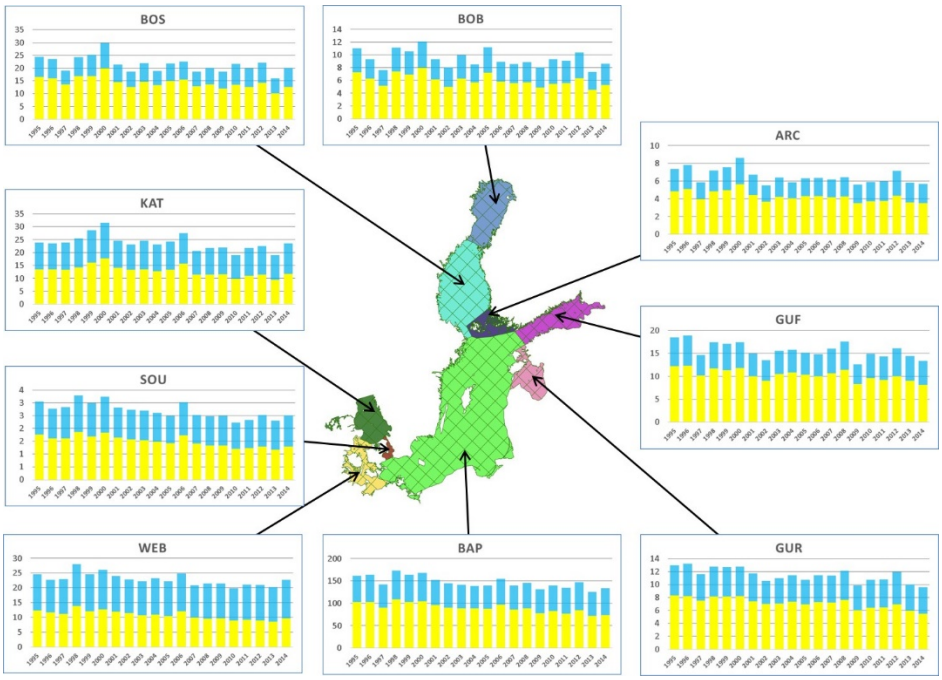

Figure 11: Atmospheric deposition of oxidized, reduced and total nitrogen to nine sub-basins of the Baltic Sea for the period 1995 - 2014. Units: ktonnes N/year. Note: the scales for the sea regions are different! Sub-basins: ARC=Archipelago Sea; BAP=Baltic Proper; BOB=Bothnian Bay; BOS=Bothnian Sea; GUF=Gulf of Finland; GUR=Gulf of Riga; KAT=Kattegat; SOU=The Sound; WEB=Western Baltic (Bartnicki & Benedictow 2016).

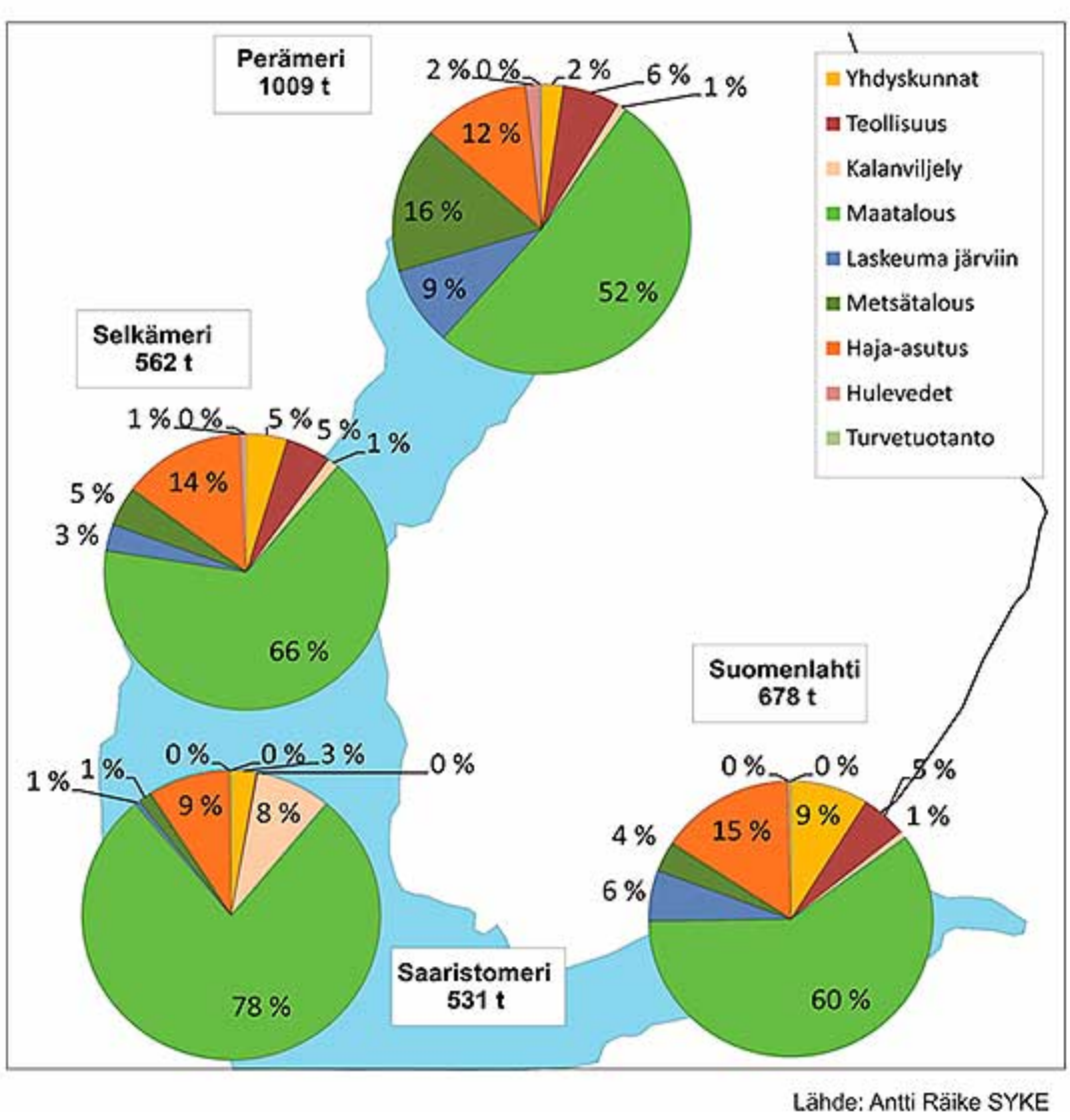

Figure 12: Approximately phosphorous load (t / a) from human activities from Finland to the Baltic Sea between years 2008-2012. Perämeri= Bay of Bothnia, Selkämeri= Sea of Bothnia, Saaristomeri= Archipelago Sea, Suomenlahti= Gulf of Finland. Color codes in statistics: yellow = communities, red = industry, beige = fish farming, green = agriculture, blue = landfall on lakes, dark green = forestry, orange = sparsely populated area, pink = rainwater, gray = peat production (SYKE 2016a).

2.1.1 Practices to help sustainability of the Baltic Sea

First significant steps to protect the sea was in 1974 when the Baltic Sea coastal countries signed the Convention on the Protection of the Marine Environment of the Baltic Sea Area called as 1974 Helsinki Convention (HELCOM 2017). The Helsinki Commission, HELCOM, which works to protect the marine environment (ocean-related UN Sustainable Development Goals) of the Baltic Sea was founded in 1980 (Meriliitto 2017, HELCOM 2017).

Different kinds of projects have been launched to solve problems of the Baltic Sea. Next, examples of the projects:

The Baltic Sea Challenge has created Tools for water protection to help operators to found the best ways to act. It is a web-based toolbox providing support for implementing water protection actions at local level. It is designed for professionals and experts who do concrete work, strategic planning or make decisions on water protection in cities, municipalities, companies, NGOs or other organizations (Baltic Sea Challenge 2017).

Barbara Jackson´s project The Baltic Sea City Accelerator (The BSCA) has a vision: Make the Baltic Sea an attractive investment area for everyone. Business, government, investors, and citizens all benefit from a healthy and sustainable Baltic Sea. The final report of the project is under process. In the project The BSCA tried to have wide impact to operators around the Baltic Sea (The BSCA 2017).

Vesientila.fi is web-portal that collects news, information, data and all kinds of material about the Western Uusimaa water bodies (LUVY ry 2017).

Puhdas Itämeri is a project-portal of John Nurminen Foundation that has a vision of clean and vital Baltic Sea. The John Nurminen Foundation funds projects that help the Baltic Sea and collect money to have more actions for the health of the Baltic Sea (John Nurmisen Säätiö 2017).

Baltic Sea Action Group (BSAG) is a foundation which activities are based on the co-operation between various actors, including the top management of the countries, the authorities and the private sector around the Baltic Sea. BSAG works by bringing together scientists and decision-makers, activating companies to find and implement solutions, and bringing together all the people involved that are needed to save the Baltic Sea. They are also organizing different kinds of events where the state of the Baltic Sea and the good practices are introduced for public (BSAG 2017).

2.2 Food system in Finland

The food chain includes all actors: producers, industry, trade, food services, consumers, advice and management (Ministry of Agriculture and Forestry Finland 2017).

2.2.1 Primary production

In 2016, there were 50,388 farms in Finland. The average area of farms was 45 hectares. Of all farms in Finland, organic farms are about 8.8% (MTK 2017).

Finnish food is safe, clean and its origin is known through the chain. High quality standards together with control ensure the entire chain's functionality (MTK 2017).

The most common production of farms is cereal cultivation. The most grain farms are in Southwest Finland and South Ostrobothnia. Greenhouse production focuses on the Pohjanmaa and Southwest Finland. Strawberries and other berries are cultivated much in North and South Savo and North Karelia. Most of the potatoes are cultivated in Ostrobothnia, but early potatoes are often from Southwest Finland (MTK 2017). Figure 13 shows the amounts of the farms in different production lines in year 2016.

Dairy farming is the largest livestock sector in Finland. The largest number of dairy farms is in North Ostrobothnia and North Savo. Most of the pig farms are located in Southwest Finland, South Ostrobothnia and Ostrobothnia. Most of the eggs are produced in Southwest Finland. The majority of farms producing poultry meat are located in South Ostrobothnia, Southwest Finland and Satakunta (MTK 2017).

Almost 90% of Finnish farms belong to the agro-environmental program approved by the EU (MTK 2017). EU agriculture policy, the common agricultural policy (EU 2017) .It serves many purposes:

- helps farmers produce sufficient quantities of food for Europe
- ensures this food is safe (for example through traceability)
- protects farmers from excessive price volatility and market crises
- helps them invest in modernising their farms
- sustains viable rural communities, with diverse economies
- creates and maintains jobs in the food industry
- protects the environment & animal welfare.

Figure 13: Number of farms per production line in year 2016. Production lines in Finland: Viljanviljely = Grain cultivation, Muu kasvinviljely = Other crops cultivation, Kasvihuonetuotanto = Greenhouse Production, Avomaantuotanto = Open-field vegetable cultivation, Lysykarjatalous = Dairy farming, Naudanlihan tuotanto = Beef production, Muu nautakarjatalous = Other cattle farming, Sikatalous = Pig farming, Siipikarjatalous = Poultry farming, Muu laidunkarja = Other grazing livestock, Sekamuotoinen tuotanto = Mixed mode on producing. (MTK 2017 based on Luke, Maataloustilastot.fi)

Agriculture and horticulture in 2016 employed approximately 116 000 people in Finland. About 46,500 of them were farmers or members of agricultural unions at work. There were approximately 33,000 family members in the agriculture and horticulture industry. There were approximately 4,000 people permanently employed on the farm. Nearly 32,000 people worked short-termed on farms (Luke 2017a).

In 2015, entrepreneurial income as compensation for agriculture and horticulture for the work and capital of the entrepreneurial family was on average 14,500 euros per year, which means a compensation of 5 euros per hour and a 1,3 per cent interest on capital. These were 32% of the targets, ie a profitability factor of 0,32. The profitability factor for the year 2014 was 0,37.

Profitability continued to be on the lowest cereal farms and other crop farms in 2015, with profitability factors of 0,12 and 0,17. In dairy production, the profitability factor dropped to 0,38. In greenhouse parlours, profitability weakened to 0,7, but was still the highest in production. In pig farms and poultry farms profitability ratios rose to 0,67 and 0,48.
Total return on equity was negative, by -2,7 percent (Luke 2016).

2.2.2 Food industry

The food industry is the fourth largest industry in Finland. Before that, only the metal, forestry and chemical industries. The food industry employs about 34,000 people in Finland. There are about 2000 offices. The industry is divided into two main sectors, for food production and beverage production. In addition, there are about a thousand micro-enterprises in the food business in Finland, for example in farms. The major of the sector is micro-enterprises, as 75% of the outlets employ less than 10 people. The sector is also a major provider of seasonal work. There are offices throughout Finland, and many of them are key employers in their area (Hyrylä 2016, Ruokatieto 2017).

The sector is heavily dependent on domestic primary production. Raw materials used in industry are mostly domestic, about 85% (Hyrylä 2016, Ruokatieto 2017).

The biggest Finnish food companies are (Ruokatieto 2017):

- Valio Oy (milk processing)
- Lännen Tehtaat plc (vegetable packagings, vegetable oils, fish processing, grain trade)
- Raisio Plc (oils, fats, mills, feed)
- HK Ruokatalo Oy (meat processing)
- Atria Plc (meat processing)
- Fazer Group (bakery products, confectionery, chocolate)
- Vaasan Oy (bakery products)
- Oy Hartwall Ab (malt and soft drinks)
- Saarioinen Oy (meat processing, ready-made meals, canned food)
- Oy Gustav Paulig Ab (coffee, spices)
- Oy Sinebrychoff Ab (malt and soft drinks)

The gross value of the food industry by the preliminary data for 2015 was 11,3 and the value of processing was 2,5 billion euros. In 2015, the turnover of the food industry decreased by 536 million euros, i.e. the total turnover was 10,6 billion euros. In the manufacture of beverages, the decline in net sales has been strong in recent years. Almost half of the food industry's net sales consists of meat processing and the manufacture of dairy products. The profitability of the food industry is moderately low (Hyrylä 2016).

The competitive situation is tense. Competition has been steadily increasing as the global food market unfolds. Competition has been tightened by sluggish growth in demand, tight price competition in domestic and export markets, concentration of grocery trade, increased imports and increased supply of its own brands and reduced exports. Food prices have fallen since 2014 (Hyrylä 2016).

Despite the challenging business environment, the industry has invested in streamlining production and renewing its operations (Hyrylä 2016).

2.2.3 Wholesale and trade of retailing groceries

Finland's grocery trade is concentrated. The S Group and K Group's combined market share in 2016 was over 80%. Figure 14 shows the breakdown for groups in sector. Food trade is largely domestic, significant only Lidl that came 2002 in Finland. Market chain positions vary regionally and competition takes place mostly at the store level (Hyrylä 2016, PTY 2017).

GROUP	MARKET SHARE %	GROCERY SALES (MEUR)
S Group	47.2%	7,896
K Group	36.2%	6,055
Lidl*	9.3%	1,551
Tokmanni Group*	1.7%	276***
Suomen Lähikauppa Oy (until 11 April 2016)	1.5%	249
Stockmann*	1.0%	165
Minimani*	0.6%	93
M-ketju*	0.6%	93**
Other private*	1.9%	360

Grocery sales incl. VAT Kesko Plc bought Suomen Lähikauppa Oy in April 2016.
Source: Nielsen Finland Oy, marked with*, source: Finnish Grocery Trade Association
** M-ketju figure total sales, incl. household goods, source: Finnish Grocery Trade Association
*** Tokmanni Group, incl. all Tokmanni stores and their grocery sales, source Finnish Grocery Trade Association (PTY).
Nielsen Grocery Shop Directory only includes some of the Tokmanni stores.

Figure 14: Market shares of Finnish grocery trade groups in 2016. (PTY 2017).

The economic downturn has made consumers more price conscious, which has heightened competition. The recession has raised the popularity of Lidl-like convenience stores (Hyrylä 2016).

Grocery trade is less dependent on domestic agricultural production than the food industry. Grocery trade competes for the products they buy from the domestic food industry with each other and with foreign companies and their own imports. In Finland, wholesale purchases of

groceries are mainly made through five supply chains: Central Cooperative Society SOK, Kesko Food Ltd, Tuko Logistics Cooperative, Lidl Suomi Ky and Tokmanni Oy. In addition, purchases are made through international purchasing companies (Hyrylä 2016).

There are over 4,000 different stores in Finland, of which almost 3,100 grocery stores. The Finnish grocery trade is characterized by chaining and the concentration of procurement and logistics. The store carries out a significant part of the food chain's logistics (Hyrylä 2016).

The grocery sales of Finnish grocery retailers in Finland in 2016 amounted to 16,738 billion euros. Features of the retail trade of consumer goods in Finland in 2016: Sales value development was 0,9% and sales volume development was 1,6%. Sales per resident was 3000 euros. Retail trade of consumer goods in euros compared to household (number of households in 2015) was 6302 euros. Number of stores, meaning markets, was 3002. Number of other special grocery stores, market halls and direct sale halls was 877. Number of residents/grocery stores was 1415 (PTY 2017).

2.2.4 Supporting agriculture and agro system practices

Important ways to prevent leaching of nutrients to water by measures for reducing phosphorus and nitrogen losses from agriculture. HELCOM´s Revised Palette of measures for reducing phosphorus and nitrogen losses from agriculture 2013 introduces ways to have more sustainable food production.

- A. Soil management (a. Plant cover in winter, b. Minimal cultivation systems, c. Cultivate land for crop establishment in spring rather than autumn, d. Catch crops, e. Ploughing of ley on sandy soils in autumn, f. Controlled subsurface drainage)
- B. Fertilizer and manure management (a. Fertilization plans and Nutrient balances, b. Conversion from conventional to organic production, c. Reduced fertilization, d. Application techniques of manure, e. Integration of fertilizer and manure nutrient supply, f. Liming, g. Avoiding the application of fertilizers and manure to high-risk areas, h. Avoiding the spreading of fertilizers and manure during high-risk periods, i. Increasing the capacity of manure storage,

j. Transporting manure to neighboring farms, k. Slurry separation, l. Composting solid manure, m. Biogas production from manure and other agriwaste biomass, n. Palletization, o. Incineration)

- C. Animal feeding (a. Adopting phase feeding of livestock, b. Reducing dietary nitrogen and phosphorus intakes, c. Animal feed supplementation (phytase and amino acids), d. Wet feed and fermentation)
- D. Farm infrastructure (a. Establishment of wetlands, b. Buffer zones, c. Converting arable land to extensive grassland)
- E. Other (a. Effective purification of runoff waters, b. Ditch Filters and Dams, c. Systematic on-farm Advisory Services)

Turtola, E. et al. (2017) published a report where they show that the use of nutrient balances in agriculture can benefit both crops and the environment. The project produced the distribution of nitrogen field balances for the most common crops in Finland by combining all available and systematically collected nutrient data from arable crops. The results were illustrated by the presentation of preliminary criteria for the assessment of nitrogen balance and for some plants the reference values for soluble nitrogen balance were also proposed for possible nutrient balance control. The strength of nutrition-based guidance was identified as a consideration of the saturation level, which could stimulate basic improvements in the fields.

Sustainability is important part of the food system. It becomes more and more vital when the climate change affects to all systems of the world negatively and at the same time the population is growing and we need more food (FAO 2017).

When the company has a strategy to follow they have better results. Figure 15 show one idea how to manage sustainable community action plan (Urgent VC, LLC 2012).

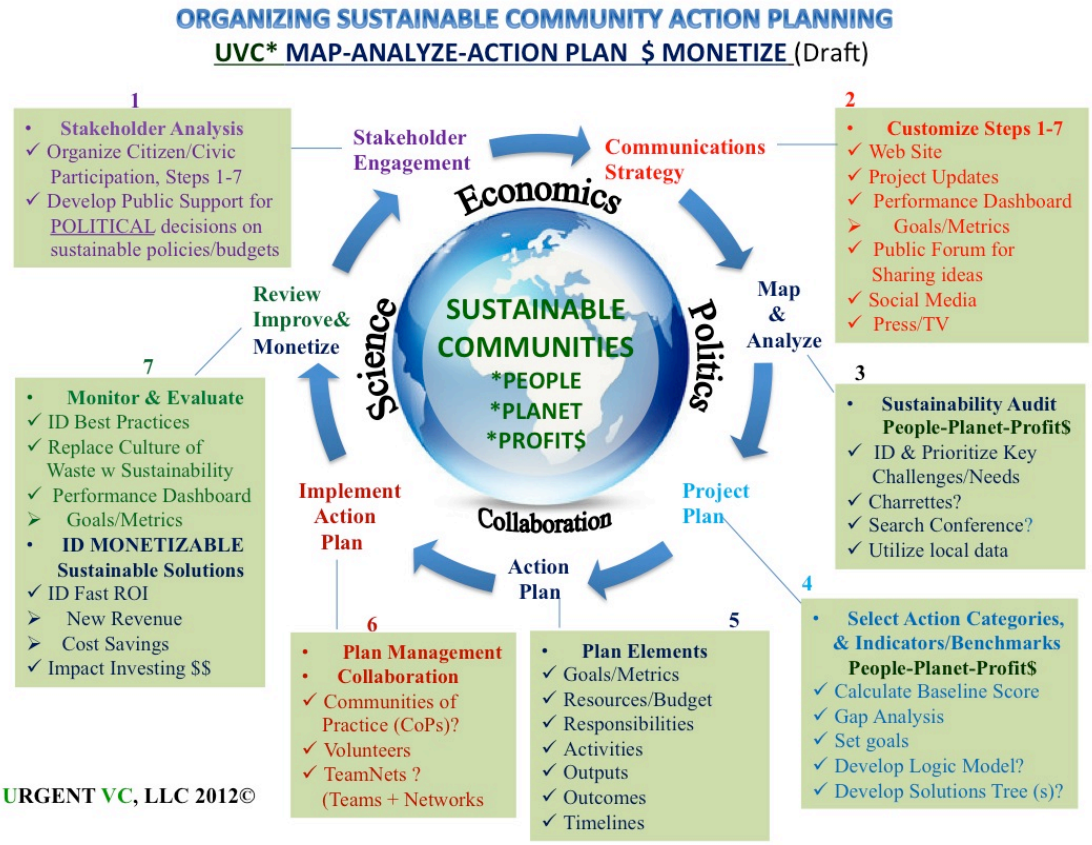

Figure 15: Idea how to organize sustainable community action planning (Urgent VC, LLC 2012).

Pilot projects have been launched to test more sustainable ways of food system. One good example is a concept of farms in Hyvinkää, Uusimaa called Palopuro agroecological symbiosis. They have created a concept of food system where all the needed are close together. The agroecological symbiosis of Palopuro is a model-based nutrition and energy-friendly local food system. Local producers are with each other in symbiosis, a collaborative effort that is beneficial to everyone. Symbiosis includes both primary and food processing companies (Krohn 2016, Karmitsa 2017).

Interaction with all the participants in food system are more taken into consideration these days. For example, Ministry of Agriculture and Forestry have been asking operators ideas when they are making new operational lines for politics. They added for example videos to Facebook and had survey for anyone to tell their opinion (Ministry of Agriculture and Forestry Finland 2017).

Järki-hanke help to have sensible agriculture in Finland. Towards more vivid biodiversity and cleaner waters with rational solutions to agriculture. This project arranges many events for farmers and all the operators of the food sector to understand the scientific certified acts for more sustainability (Järki 2017).

3 Methods used in the research

This study is qualitative research. Qualitative methods are used to find individuals 'perceptions of the topic (Bell & Waters 2014, Flick 2002, Davies & Hughes 2014). Information is gathered with a survey. The survey is made as interviews (Bell & Waters 2014, Flick 2002, Davies & Hughes 2014). The interview method used in this study is in-depth research interview (Research Methods for Business and Social Science Students / nn, Flick 2002). Table 2 demonstrates the stages of the research work process.

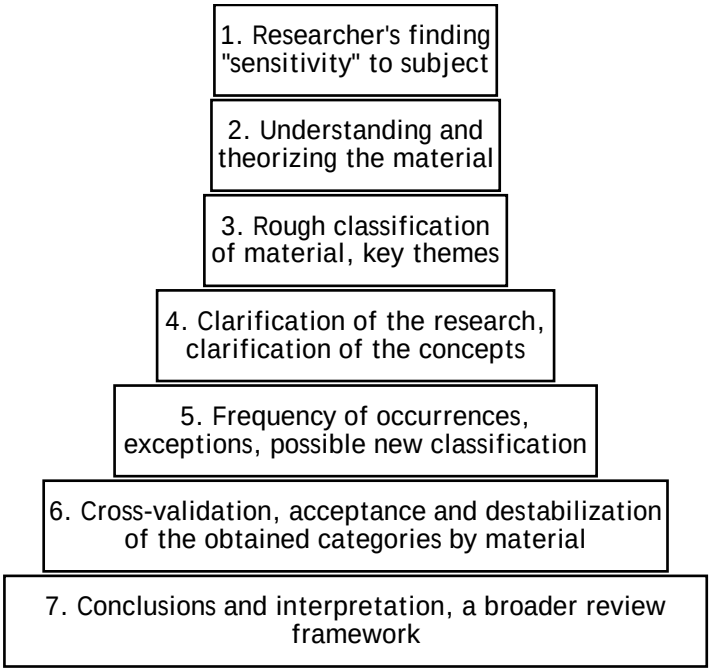

Table 2: Stages of analysis of the content of the research material (Syrjäläinen 1994 and Metsämuuronen 2009).

A semi-structured or thematic interview is ideal in a situation where the research subject is not fully understood and the interviewers must avoid leading the respondents. An open interview is more flexible than the other types of interviews. It has a discussion rather than an actual interview. It is suitable for collecting in-depth information about what people think or why they behave in a certain way, etc. (Davies & Hughes 2014, Ojasalo etc. 2009, Tiittula & Ruusuvuori 2005, Flick 2002).

These interviews have been conducted as an Expert Interview Method (Meuser & Nagel 1991). An expert interview means a situation in which an interviewee will be asked to get information about the phenomenon or process being investigated. The subject of interest is not the interviewee himself, but his knowledge. The interviewees are selected due to their institutional status or other relevant involvement (Davies & Hughes 2014, Alastalo & Åkerman 2014, Flick 2002) and they are from the Uusimaa area. The representatives were approached by an email (Appendix 2). In addition, those who were contacted by phone or by someone else's recommendation were sent the email to give information about the study setting and purpose.

Interviews are divided to four categories to represent the total actors in the sector of the food production cycle. Four categories are A) Companies, B) Administration/ government, C) Research, teaching and development and D) Citizens and civil society organizations. Categories are introduced deeper in table 3. When the focus in the study is in the beginning of the food chain consumers were not interviewed.

A) Companies and corporations	B) Administration and government
C) Research, teaching and development	D) Active citizens and civil society organizations, interest groups and advocacy groups

Table 3: The actor groups of the food production sector.

The interview questions (Appendix 1) were formulated so that after background information, the basic questions were about sustainability, the food system and the Baltic Sea, followed by deeper questions about the topic (Davies & Hughes 2014, Flick 2002). Appendix 1 has the document of the questions used, originally in Finnish. PESTE-analysis was used to help the interviewees to think about the complex topics. PESTE comes from words: Political, Economic, Social, Technological and Ecological point of view. PESTE-analysis is designed by Tarja Meristö (1991) to chart the factors affecting the Future (Metsämuuronen 2009).

The material collection was designed so that the use of the material was accurately communicated to the interviewees' right from the start. The raw data and identification of the interviewees was already agreed as a secret at the outset. The use of the material and partly confidential information was only used for this study. In that way it could be guaranteed for the interviewees that their talks are not affecting to their institutional status or credibility (Tiittula & Ruusuvuori 2005, Kuula & Tiitinen 2014, Flick 2002).

In the interviews the discussion was done so that the interviewer tried to be as neutral as possible to not to affect the running of the conversation. The interviewer also tried to not give answers to lead the conversation. In addition, the questions needed to be same for all interviewees to get equal material (Ruusuvuori & Tiittula 2005, Flick 2002).

The collected material was transcribed for analysis of the actual data. The material selection was made on the basis that the material had then only the relevant information for further analysis of the collected information (Bell & Waters 2014, Metsämuuronen 2009, Syrjäläinen 1994). After that the most important themes and frequency of the phenomena, as well as exceptions were classified from the material. Data was analyzed with basic methods to find the most relevant points, e.g. Prosents and comparisons. Data matrix was also analyzed with SPSS. (Davies & Hughes 2014, Bell & Waters 2014, Flick 2002, Metsämuuronen 2009, Syrjäläinen 1994).

Then these results were compared with previous research on the subject. The basis of these conclusions and interpretation was built on then with this information, where the result of the analysis was transferred to the broader context of the review (Davies & Hughes 2014, Bell & Waters 2014, Metsämuuronen 2009, Syrjäläinen 1994).

Due to the limited resources the amount of representatives in the sample is low. In addition, the inverviewees were not selected randomly because the total group had to consist of experts in the field of the study. Yet, there were actors from all the actor groups and they were from Uusimaa region.

The methods for gathering the sample was a stratified sample (Metsämuuronen 2009). Representatives were found from the Internet by searching for experts from, for example, major food production companies, public administration, research instutions and civic organizations. Farms were found, for example, from a web portal of Avoinmaaseutu (Open countryside). Furthermore, interviewees gave hints about important experts to contact.

The demographical measures are based on the qualifications of the Statistics Finland (2017).

As the subgroups did not have enough data to be analyzed as such with IBM SPSS Statistics, they were clustered. Then the ANOVA -test and Boferroni –test were carried out with at least two variables in a group (Metsämuuronen 2009).

After interviews the ideas were compared in the Future Workshop. There the current state was outlined first and then the possible Future ideas were discussed. The idea was to have a group discussion and produce ideas together (Metsämuuronen 2009, Meristö 1993).

4 Findings from the interviews

4.1 Basic backgroud information of the interviewees

All interviewees were specialists of one or more of these main themes:

- food system
- food production or part of it
- water
- sustainability

Group A (Companies and corporations) included a variable group of companies. There were representatives of different kinds of farms, e.g. a small livestock farm, greenhouse businesses, a multifunctional farm with tourism and a grain producer. Then there were also large-scale companies, e.g. a milkproducer and a grain products processing firm. Group B (Administration/ government) included representatives from different levels of administration, from officer to city administration and ministry. Group C (Research, teaching and development) included researchers from universities to research centers and teachers of the particular topic. Group D (Active citizens and civil society organizations, also interest groups and advocacy groups) included a large-scale of the people. This group included representatives e.g. from different interest groups, civil activity groups, labor and industry protection and individual persons that are interested about this particular topic specifically.

Group A included 10 persons (38% of total), group B had 4 persons (15%), group C had 10 persons (38%), and group D included 11 persons (42%). There were 46% men and 54% women in the research group. The ages of the interviewees were under 40 years 9 persons (35%) and over 40 years 17 persons (65%).

Three quarters had a bachelors degree, one quarter had a master degree or upper, and only one person had an upper secondary degree (table 4). Table five shows that 73% of the interviewees were employees. Table six presents in more detail work industries of the interviewees.

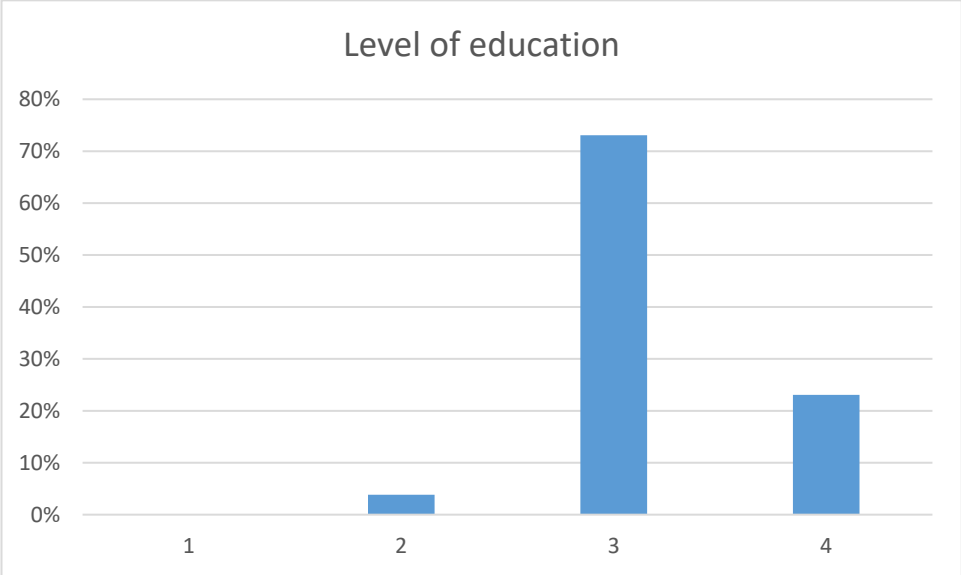

Table 4: Level of education of the interviewees, 1= Basic education 2=Upper secondary education/ 3= Bachelor degree 4= Master degree or upper.

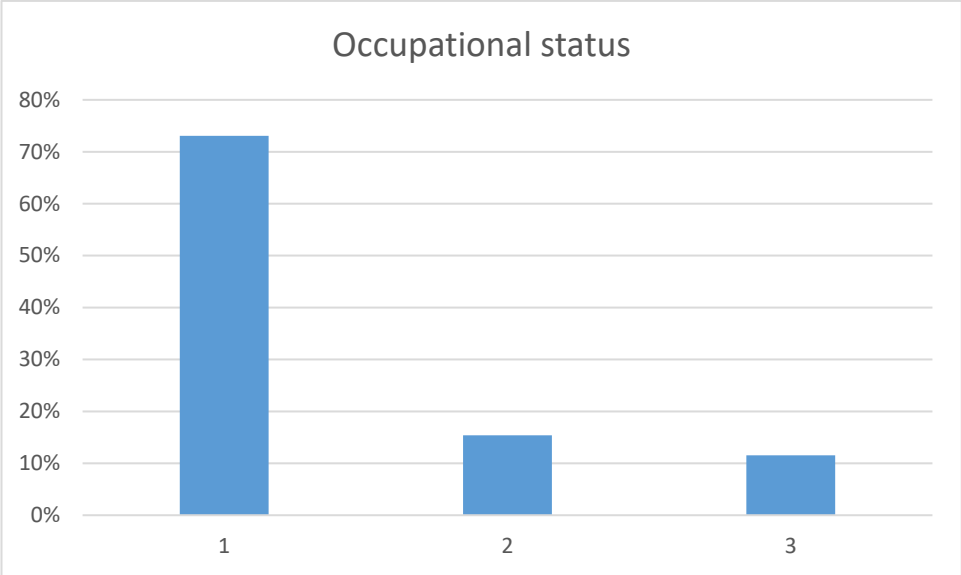

Table 5: Occupational status of the interviewees, 1=Employee 2=Entrepreneur 3=Both.

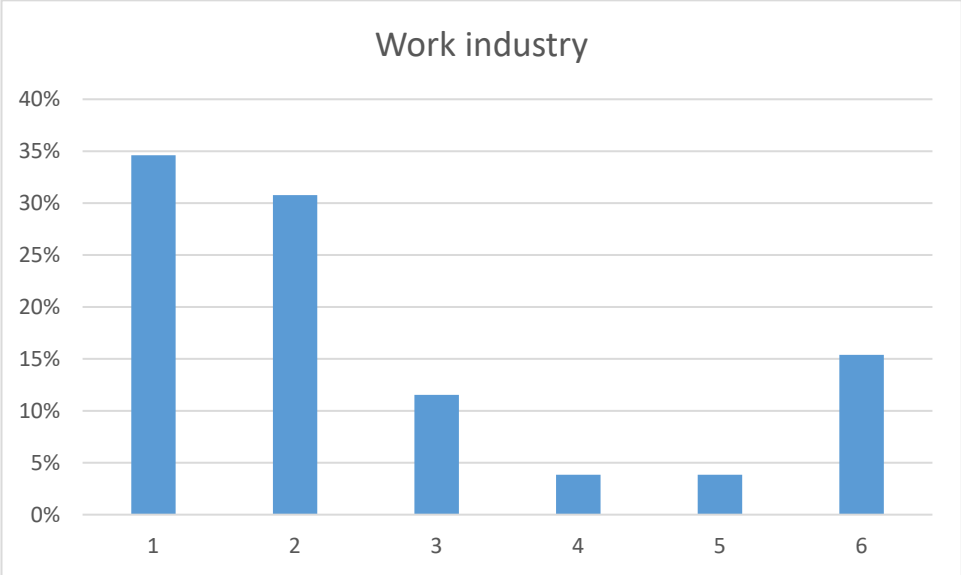

Table 6: Work industry of the interviewees: 1) Managers, 2) Specialists, 3) Experts, 4) Office and Customer Service Workers, 5) Service and Sales Employees, 6) Farmers, Forest Workers, etc.

4.2 The Finnish food chain actors´ thoughts about sustainability

Below are examples of the interviewees´ thoughts about background factors of sustainable food production:

- nature, economy and people
- ecology
- social fairness
- justice

The meters of the sustainability were asked (table 7) because it gives a hint of the person's level of knowledge about the topic. It raises new thoughts of the topic in discussion too.

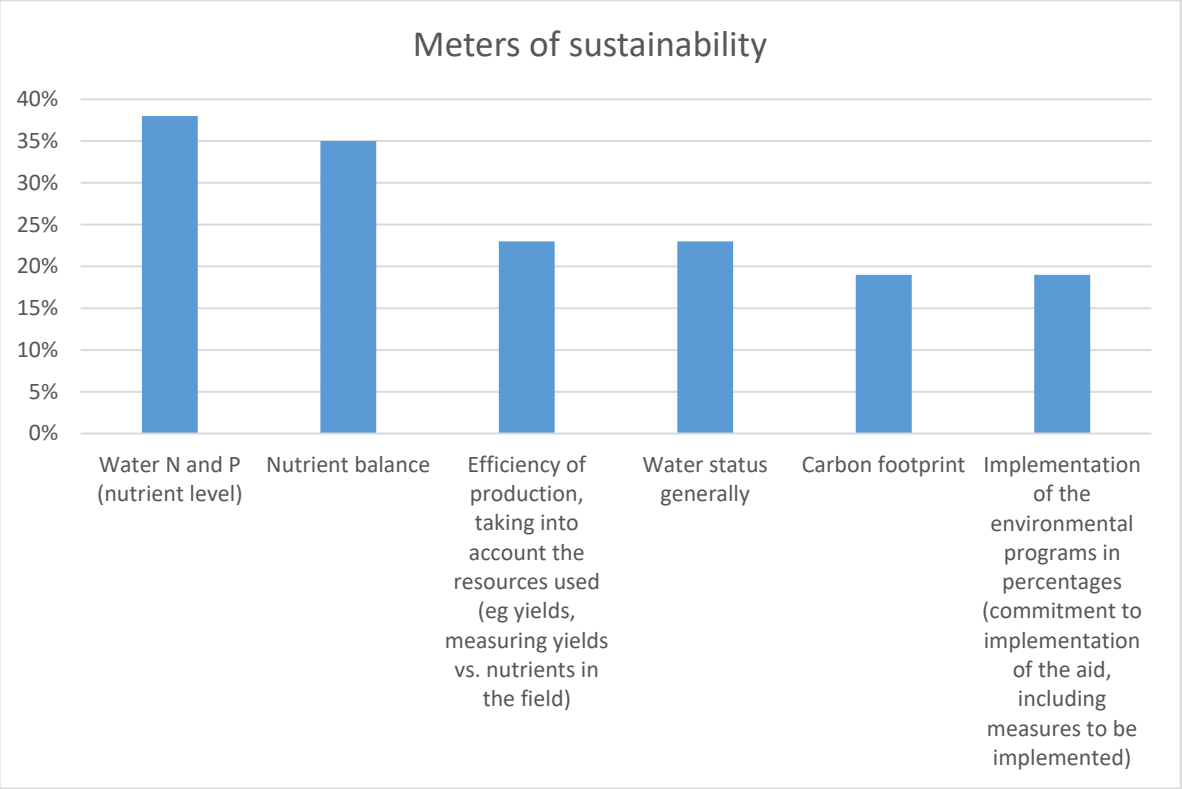

Table 7: The most common ideas of the meters of sustainability in the interviews.

Appendixes 3 and 4 introduces deeper the findings of the sustainability thoughts.

4.3 Analysis of the interview answers

Presentation of the findings of key problems and solutions in the relation between The Baltic Sea and food production.

4.3.1 Key problems

The analysis of the interviews revealed 50 different key problems in relation to the food system and the Baltic Sea. All the interviewees said that the level of knowledge of all the actors is not high enough and the long-term investments are weak for the important parts of the food system processes.

Other important problems found from the discussions were the agricultural weak actions, lack of resources and money, the balancing of the social, ecological and economical aspects are

hard for the farmers, co-operation between operators is not enough, competition is hard and the knowledge and the distribution of the verified information are weak.
Table 8 presents findings from the interviews in more detail and the weights of the comments in all 26 interviews. Table 9 illustrates the most common thoughts related to key problems.

% of 26	**Key problems of food system and the Baltic Sea**
100 %	The level of knowledge of all the actors is not enough
100 %	Long-term investments are weak
88 %	Recycling of nutrients is weak
88 %	Balancing of the small entrepreneurs sos, ekonom, ekol. is hard
85 %	Consumers' knowledge about food and farming is low
85 %	Slow or lack of research information distribution for the public
85 %	Co-operation between different levels of actors is not enough
85 %	Habits and traditions affects choices
85 %	Missing technologies and practices
85 %	Hard competition
77 %	Businesses identify the key effects of their actions to the Baltic Sea and the measures for it
77 %	The food network is poorly understood, everything affects it
77 %	The weak economic situation as a whole
77 %	The economic situation is weak on the farms
77 %	Blaming others -> no discussion
73 %	Narrowly limited operation of small food business owners
73 %	Financial sustainability thinking is missing
73 %	Cheap food
69 %	Field growing ability elements are not good
69 %	Economic interests (moneylessness or greed)
65 %	Trust in knowledge is weak
62 %	Images created by the media do not always meet reality
62 %	Income distribution is not fair
62 %	Center businesses and wholesale strong power
58 %	Ease of convenience
58 %	Disinterestedness/negligent
54 %	The understandability of innovations and research for everybody

54 %	Conflicts of interest (Opposition and strong opinions)
50 %	Making attractive products is weak
50 %	Political decisions are short-sighted
42 %	Regional differences are understood relatively poorly
38 %	Heavy bureaucracy
35 %	Domestic animal / plant products. Differentiation between areas
35 %	Consumer purchasing power is not high
35 %	Point sources of pollution should be limited
35 %	Finland's challenging cultivation conditions
31 %	The additional problems caused by climate change and unpredictability of the changes
31 %	A small group decides politically
31 %	Fugitive emissions should be limited
31 %	Valuation of Agronomy is weak
27 %	Coarse fish level of usage is weak
27 %	Reduction of phosphorus resources
23 %	Weakness and weakening of the self-sufficiency ratio
19 %	The problemacy of the rented land
19 %	Long distances
19 %	The flood of information, what to follow
15 %	Growing farm sizes
12 %	Community planning problems
12 %	Environmental research is separate from other biology and agriculture teaching
4 %	In Finland, subsidies are tied to the number of livestock

Table 8: Findings from the interviews of the key problems in the relation of the food system and the Baltic Sea and the prosentual weight of the comment in all interviews (N=26).

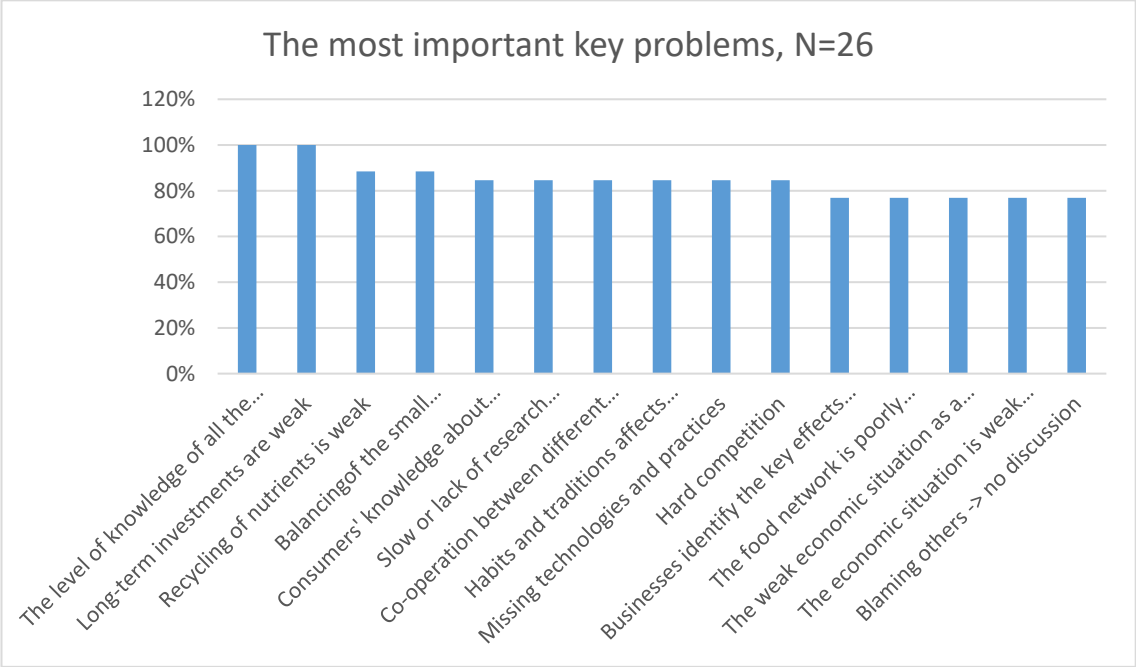

Table 9: Percentage of the most important key problems between food and the Baltic Sea analyzed from the all interviews, N=26.

In general, comments were quite similar between groups. Although, the comments with the highests persentages differed between groups. Next, there are examples of these differences:

- Groups C and D valued high ´consumers' knowledge about food and farming is low´
- Group D was the only group that did not value ´co-operation between different levels of actors is not enough´.
- Groups B and C valued high ´The food network is poorly understood, everything affects it´.
- Groups A and C found important ´The weak economic situation as a whole is important´.
- Only group A commented that ´the field growing ability elements are not good´.
- Groups A and D valued economic thought.
- Only group B thought that ´the cheap food´ is one of the biggest problems.
- Groups B and C valued high ´trust in knowledge is weak´.

Tables 10-13 presents the most relevant key problems.

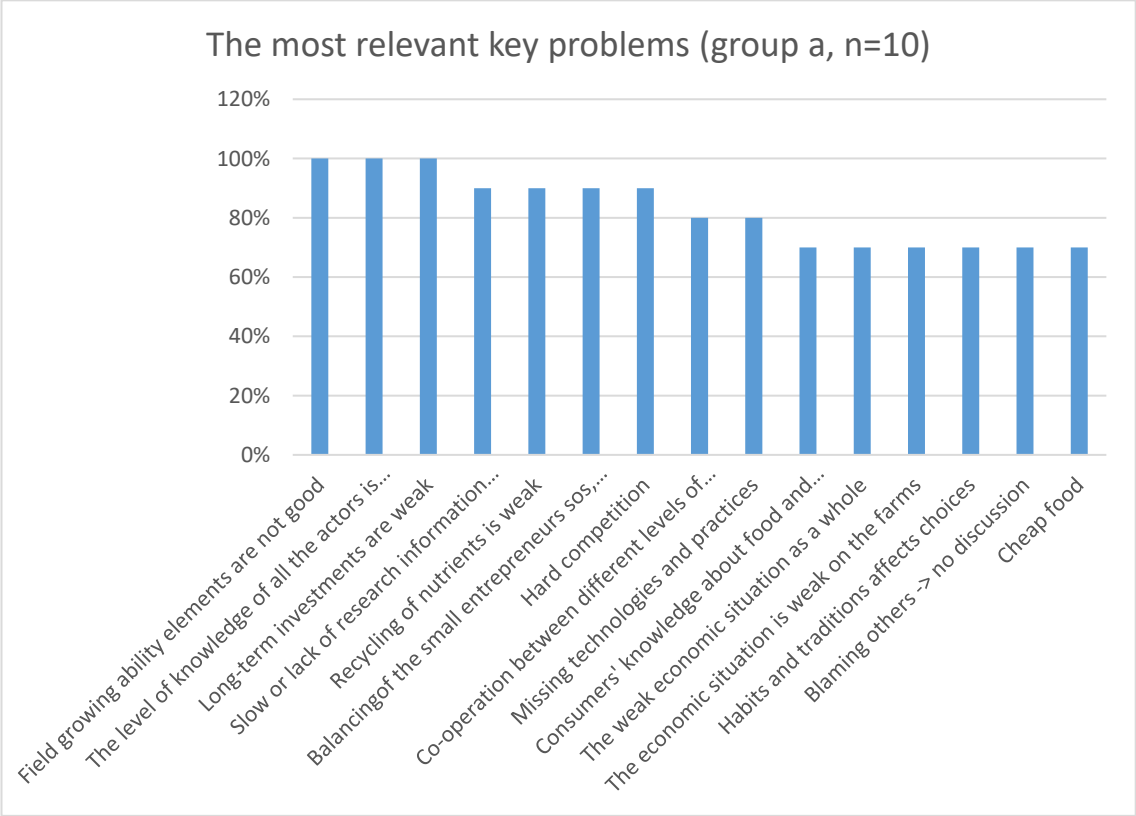

Table 10: Percentage of the most important key problems between food and the Baltic Sea analyzed from the group a (companies and corporations), n=10.

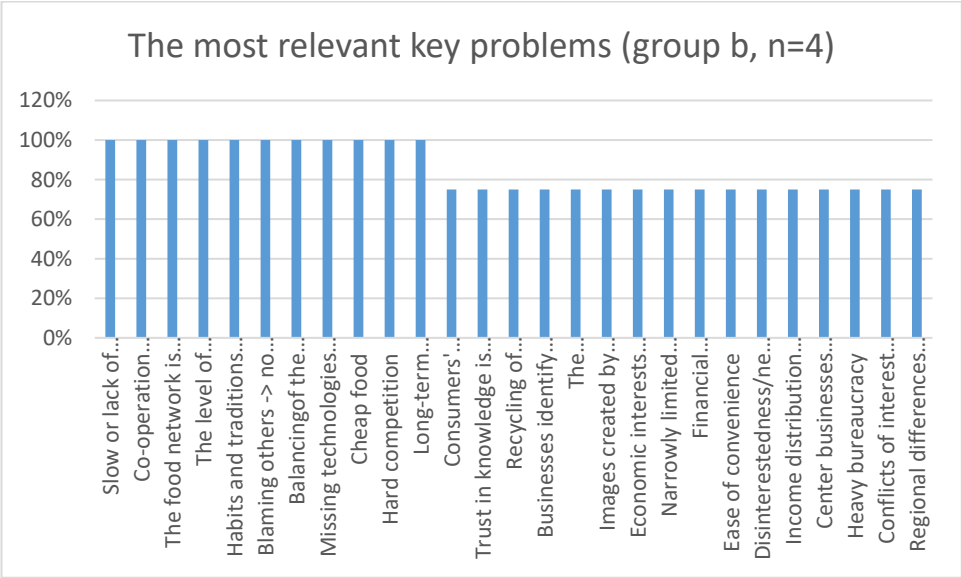

Table 11: Percentage of the most important key problems between food and the Baltic Sea analyzed from the group b (administration and government), n=4.

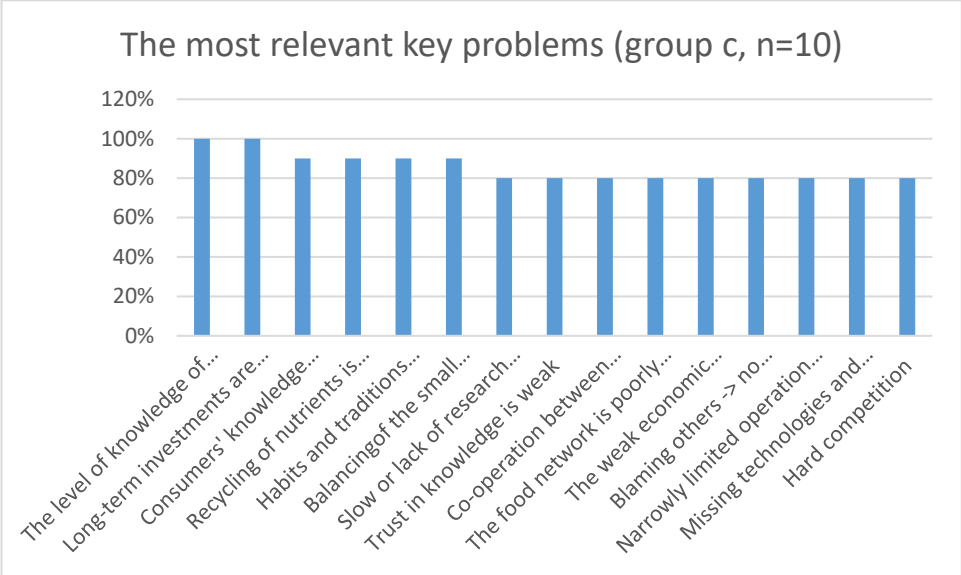

Table 12: Percentage of the most important key problems between food and the Baltic Sea analyzed from the group c (research, teaching and development, n=10.

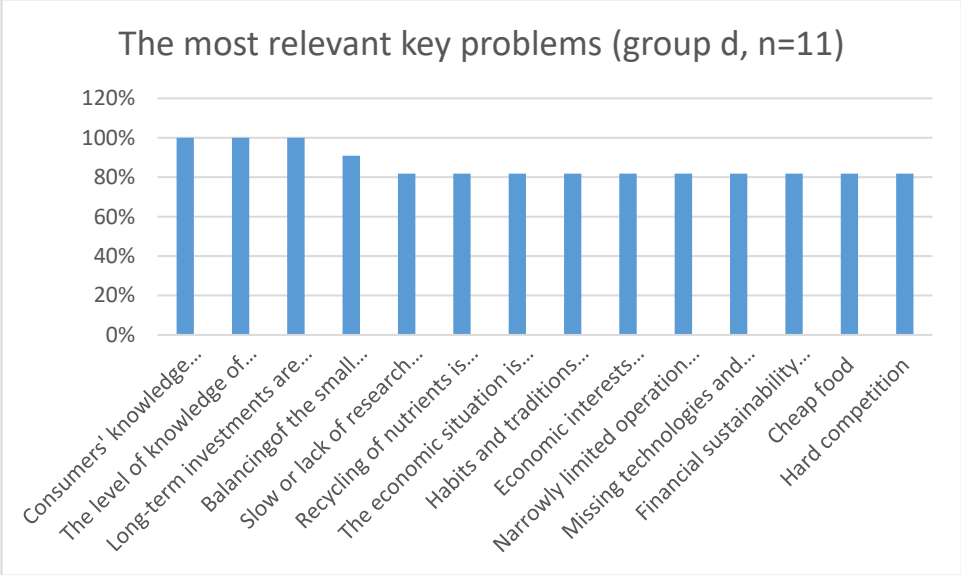

Table 13: Percentage of the most important key problems between food and the Baltic Sea analyzed from the group d (active citizens and civil society organizations, also interest groups and advocacy groups), n=11.

4.3.2 Ideas of solutions

The interviews provided 45 different solutions to key problems in relation to the food system and the Baltic Sea. It is important to point out that nearly all of the interviewees commented that the key is co-operation. Also most of the interviewees commented that the key solutions are: concrete measures and actions, targeted action on a large scale, political control in the direction of sustainability, better and more widely distribution of the researched information, tracking and meters that work, development and introduction of new technology, encourage to experiment for farmers, training of basic ecology, food, sustainability and etc. and minimizing the usage of the energy, water and resources.

It can be seen that the knowledge and the open distribution of the information are highly valued and tracking and measuring of the actions are thought to be key practices to help the problems. The table 14. shows below the solution ideas found in the interviews and the weights of the comments in all 26 interviews. Table 15 illustrates the most common thoughts of solution ideas.

% of 26	**Solution ideas to key problems of food system and the Baltic Sea**
96 %	Co-operation
88 %	Concrete measures and actions
88 %	Targeted action on a large scale
88 %	Political control in the direction of sustainability
85 %	Better and more widely distribution of the researched information
85 %	Tracking and meters that work
85 %	Development and introduction of new technology
81 %	Encourage to experiment for farmers
81 %	Training of basic ecology, food, sustainability and etc.
81 %	Minimizing the usage of the energy, water and resources
77 %	Project acts and advisory
73 %	Soil condition improvements
73 %	Citizens' awareness of farming should be improved
69 %	Better use of public administration know-how
69 %	Enhancing environmental awareness through the social media and other media
69 %	Exact actions

65 %	Transparency
65 %	Productisation of companies
65 %	Sustainable purchases
65 %	Respect of the close produced products
65 %	The principle of continuous repentance
54 %	International co-operation
54 %	Thinking about financial sustainability, balance understanding
42 %	The encouragement of voluntary action groups
38 %	Environmentally friendly programs within companies
38 %	Better use of livestock manure
35 %	Make a vegetarian diet easier
31 %	Management of fishery (usage of the coarse fish)
31 %	Action events for Citizens
31 %	Better waste food management (no food to trash)
27 %	Certificates for Good Actions (Standardized)
27 %	There might be a guide list, which affects the Baltic
27 %	The farmer must be involved in all decisions and preparations
27 %	Commitment/engagement
23 %	Environmental impact should be reflected in the price of meat
23 %	Industry should make tangible reforms
23 %	Resource Efficiency Meters as part of leadership and strategy
19 %	Good side effects done by growing lifestock
19 %	Utilization of Life Cycle Analyzes
15 %	Food Cooperatives
15 %	Waste water management
12 %	Apparent cultivation out
8 %	Increase of cowork and contracting of machines by farmers
4 %	Weighting for the Seasonal food
4 %	Field experiment testing

Table 14: The solution ideas in the relation of the food system and the Baltic Sea and the prosentual weight of the comment in all interviews (N=26).

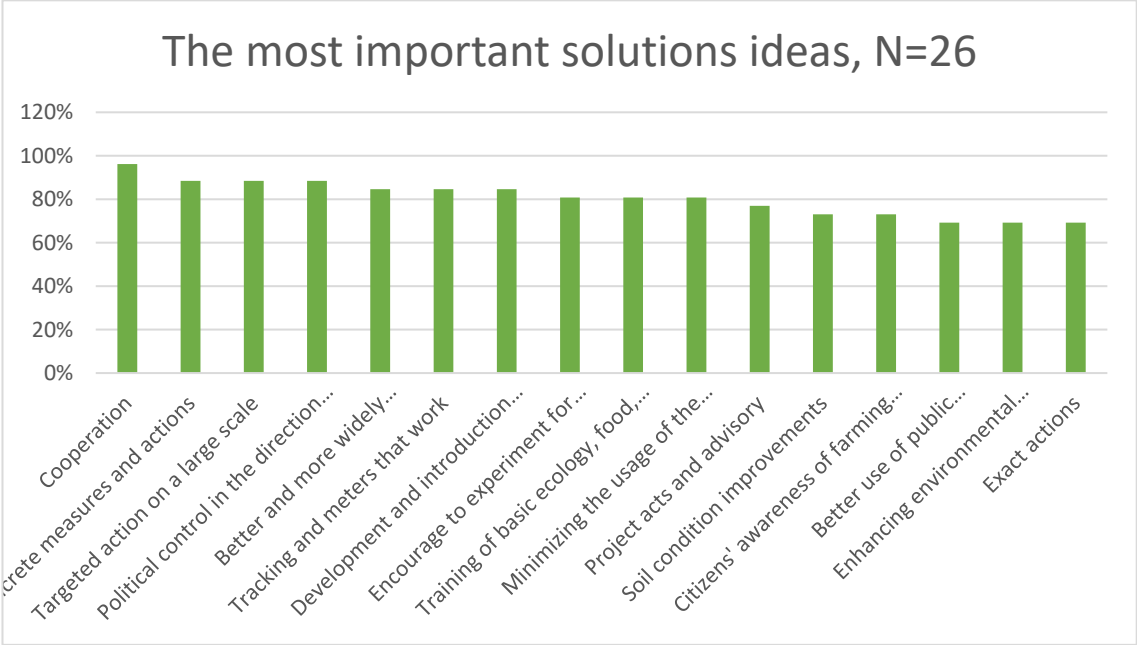

Table 15: Percentage of the most important solutions ideas to the key problems between food and the Baltic Sea from the all interviews, N=26.

The most common comments were similar for all groups. Still, the differences can be found when comparing the groups. Next, there are examples of the differences between groups:
- All groups valued high ´co-operation´, ´concrete measures and actions´, ´political control in the direction of sustainability´, and ´tracking, and meters that work´.
- Only group B did not value high ´targeted action on a large scale´.
- Group C was the only group that did not think ´encourage to experiment for farmers´ to be the one of the most important ones.
- Group B was the only did not value high ´training of basic ecology, food, sustainability etc.´ when the group D valued it as the most important.
- Only group B commented ´project acts and advisory´as a high important.
- Group A valued high ´soil condition improvements´.
- Group B thought that the one of the most important were ´targeted action on a large scale´ and ´exact actions´.
- Only group D valued high ´enhancing environmental awareness through the social media and other media´.

The most commented ideas of solutions are presented on tables 16-19.

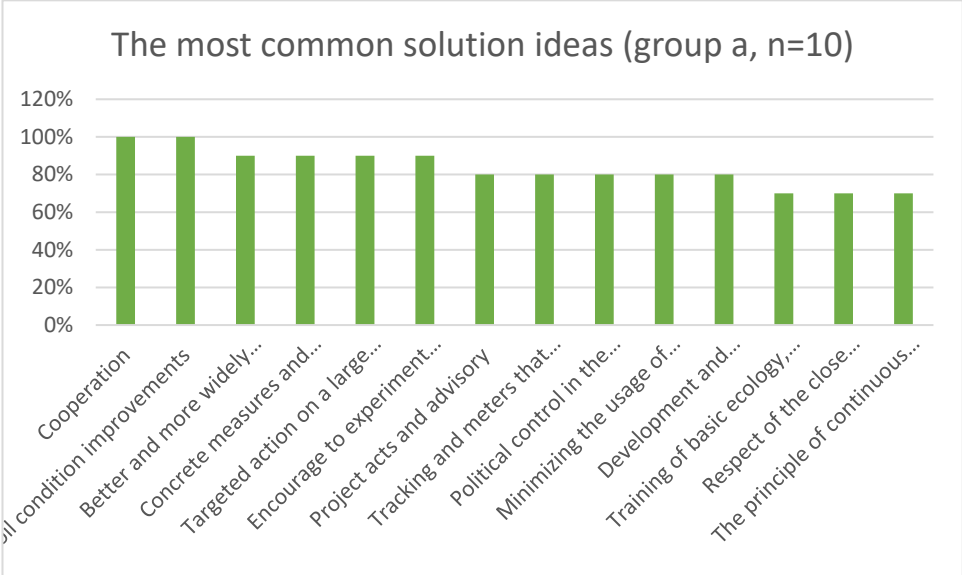

Table 16: Percentage of the most important solutions ideas to the key problems between food and the Baltic Sea from the group a (companies and corporations), n=10.

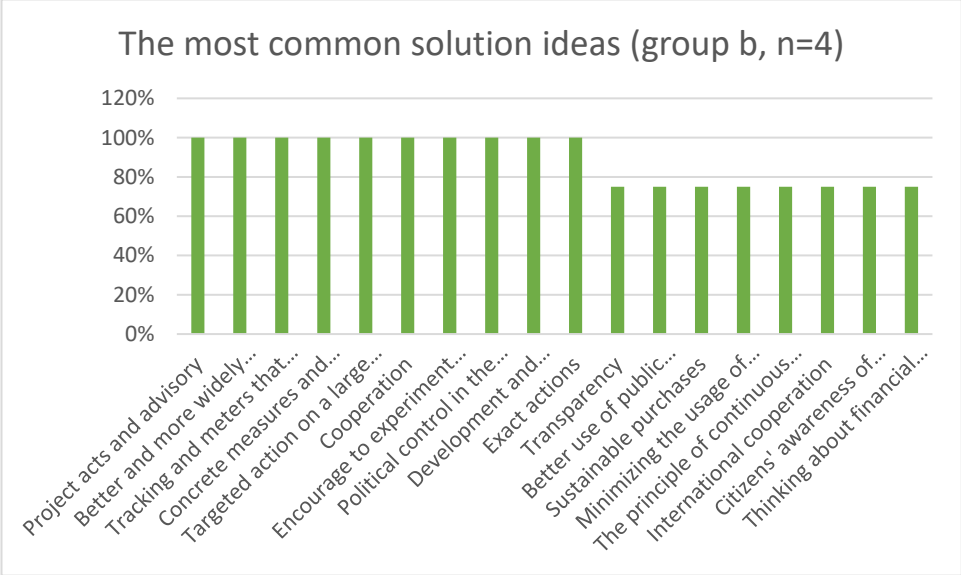

Table 17: Percentage of the most important solutions ideas to the key problems between food and the Baltic Sea from the group b (administration and government), n=4.

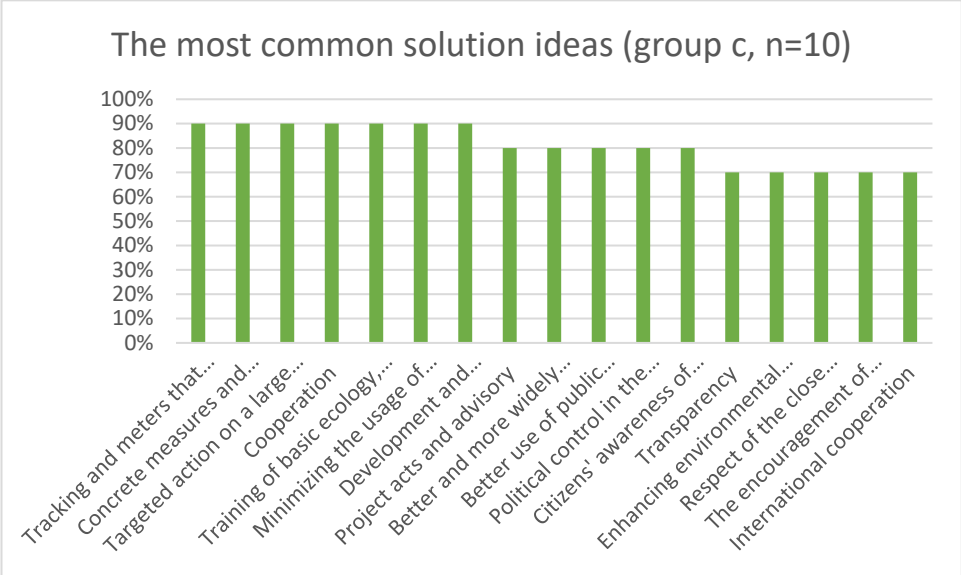

Table 18: Percentage of the most important solutions ideas to the key problems between food and the Baltic Sea from the group c (research, teaching and development, n=10.

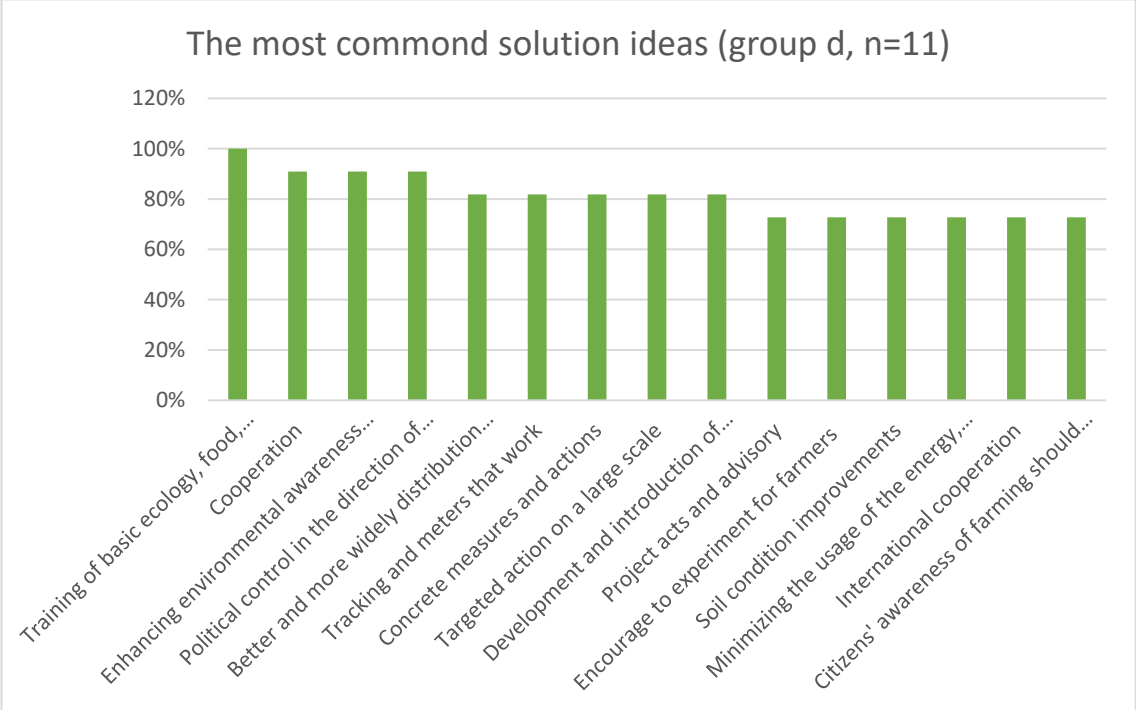

Table 19: Percentage of the most important solutions ideas to the key problems between food and the Baltic Sea from the group d (active citizens and civil society organizations, also interest groups and advocacy groups), n=11.

4.3.3 Statistically significant differences between groups

Appendix 5 introduces the clustered groups and the original themes which were gathered together in clusters.

There was very little statistical discrepancy in the material, even though there was a lot of reference pairs. This is partly due to the fact that the number of interviewees was moderately low (N = 26) and the fact that most of the problems and solutions found have been considered relevant by most of the representatives, and many comments have come from all interviewees alike.

Key problems

There were only a few statistically significantly differing pairs. There were differences between four tested pairs.

Age group and Short Vision: The views of age group 1 (under 40 years) and 2 (over 40 years) differed considerably ($p = 0.41$) from each other when looking at the short-sightedness. The older group considered the short-sighted decisions more harmful than the younger ones (Appendix 6: Fig. A).

Group a, ie Entrepreneurs and Knowledge Level Weakness: Entrepreneurs and other people's views about the level of knowledge significantly differed ($p = 0.08$). The other operators thought the level of information was worse than those who were only entrepreneurs (Appendix 6: Fig. B).

Gender and Farm Decisions / Agricultural Measures: There were differences between the sexes in how strong decisions made by the farm and agricultural measures can pose a problem. The gender difference was significant ($p = 0.015$). The men saw the problem, that farm decisions and agricultural measures are bad, more markable than women (Appendix 6: Fig. C). In addition, significant difference was found between Gender and Policy Problems: Men and women's opinions on policy issues differed significantly ($p = 0.045$). Men are more concerned with politics than women (Appendix 6: Fig. D).

Ideas of solutions

There was a statistically significant difference between only one group in terms of solutions and ideas.

Professional status and co-operation: Employees and persons who are both employees and entrepreneurs differ significantly (Bonferroni p = 0.24) regarding the importance of co-operation. Persons working only on the entrepreneur's profession did not differ significantly from the other two groups (Appendix 6: Fig. E).

5 Future Workshop for visions of solution

The Future Workshop is a method of Future research. In practice, the Future Workshop method is used to include a theme that reflects potential Future visions and practical paths to realize these visions. It is interactive method (Jungk & Müllert 1987). Van der Helm describes (2008): “Visions of the Future and the method of envisioning are common approaches for making claims about and for the Future”. The method of Future vision is to getting to know what people like to reach in the Future, and how they like to get there (Krediet 2007).

5.1 Dedcription of the Future Workshop´s background

Seven persons participated in the workshop in August 2017 and Riina Kärki was the facilitator. Approximately 120 people were invited to the Workshop, who were in a study scope (letter is attached in Appendix 7). Caused by the autumn flu, several people had to cancel their attendance at the last minute.

The Future Workshop was designed to develop ideas and proposals for the Future of a more sustainable solutionsin the food chain, specially concernign the Baltic Sea.

The Future Workshop was part of the second section of the thesis research. In the first part of the study, interviewes were done to collect material about key problems in relation to food production and the Baltic Sea, as well as suggestions for solutions to these problems. This second part describes about the Future Workshop where the key problems between the Baltic Sea and the food system were discussed, as well as suggestions for solutions and Future ideas.

5.2 Stucture of the Future Workshop and findings

1. Opening of the event and presentations

The event started with people's presentations who they are. Subsequently, Riina Kärki presented the results of the interview in the first part of the study and told about the purpose and methods of the workshop (figure 16).

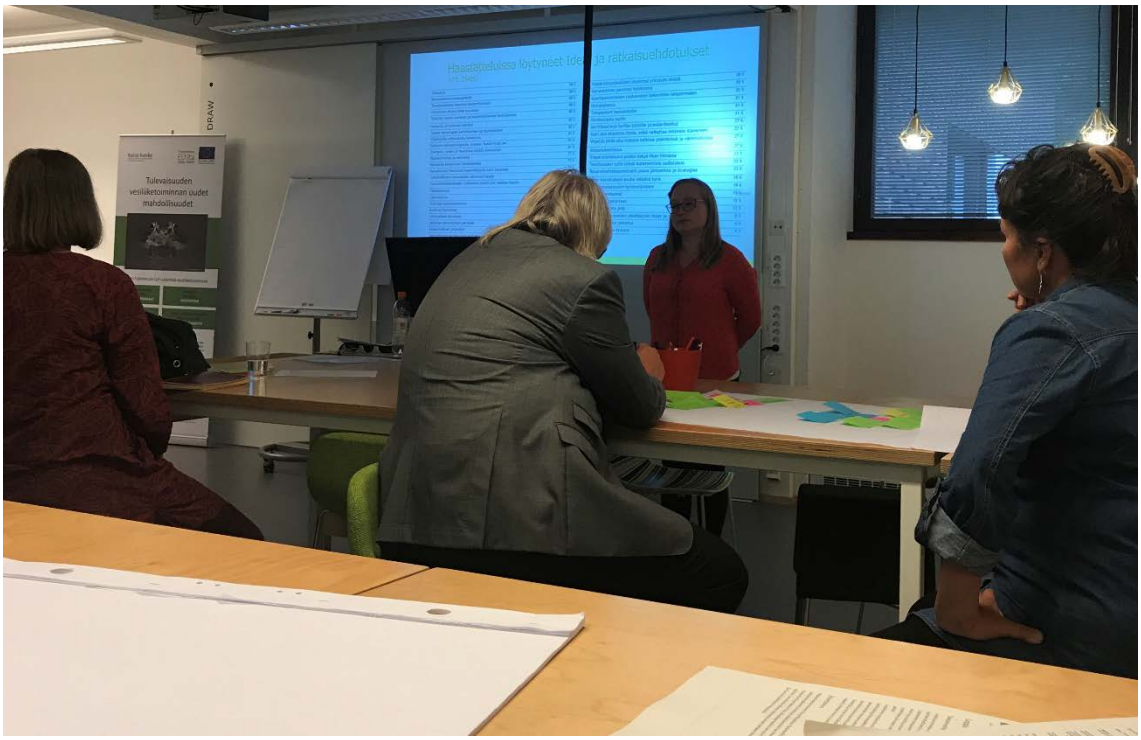

Figure 16: Opening of the Future Workshop and presentation given by Riina Kärki, (picture: Jukka Laitinen).

2. Starting the Future Workshop

The workshop started by dividing the participants into two groups (the ideal group size for the Future Workshop is 4-6 people). First group had three people and the other four. In addition, there was a facilitator.

3. Problem stage

The facilitator divided three themes into the two groups. Themes were found on the basis of interviews in the first part of the study. There were a total of six broad themes about the problems of the Baltic Sea and the food system, which were:

1) The level of competence is not sufficient,

2) There is insufficient discussion between different levels of actors, including co-operation inside levels,

3) A separate income reserve, eg a farmer receives only a small part of the final product price,

4) Research and development does not address practical activities -> Research founding public weak,

5) Long-term measures are not sufficient or missing,

6) Habits and traditions affect choices.

Heading 2) and 4) in the second group were merged because they sided so much with each other. Subsequently, the groups started typing their ideas to post-it papers about problems that are included under the themes given. Each theme had its own flip-chart paper in which post-it papaers were glued. Time to think was about 15 minutes. After this, the problems discovered were examined so that everyone presented their own reports (figure 17). At the end of the problem phase, the problems found were still grouped.

Figure 17: Discussions about the problems found related to food and the Baltic Sea, (picture: Jukka Laitinen).

4. Voting phase

After sorting out the problems found, 11 problem areas remained. Each member of the workshop had three votes and one problem could be given up to one point. After the points were awarded, the points were counted and the three problems had been the highest.

1. Co-operation Forum
    - Forms of co-operation e.g. Work groups and projects
    - Versatile preparation and follow-up
    - Multiculturalism when new people come to country -> traditions and habits can change
    - Food Citizens projects, where different people meet each other,
    - The need for dismounting
    - Excursions, farm visits with different groups
    - The views of consumers / end-users are not taken into account e.g in research projects
    - We need versatile and high-quality projects
    - Operators have their own interests
    - It is not easy to change your own perspectives
2. Know-how
    - Insufficient knowledge leads to wrong / damaging choices
    - The level of competence is not enough
    - False "assumptions"
    - Incorrect information in the media
    - Misleading information on consumer education
    - The will to change would be, but skill is missing
    - False / unfair policy measures for farmers
    - Finland's competitiveness in food exports is distorted
    - In education, the old ideas are passed on to children
    - Things are supposed to be self-explanatory
    - Education is a critical factor

3. Price

- Cheap price of food -> farmer's share is small
- The consumer does not realize where, to whom and why he or she will pay for organic or domestic when it is more expensive
- Bulk production - low price
- Too many middlemen (should be more: direct sales, less intermediate stakes, farmer gets more -> more close produced products)

5. Finding Ideas - Finding solutions and visions to the key problems

The three problems were divided so that the two most problematic issues were divided into groups as the main problem and, in addition, both considered the third problem, i.e. both groups considered solutions and Future ideas for two problems. The two main problems were shared so that the group who had found the problem gave their own problem to the other group to solve and vice versa.

6. Presentation of solutions and ideas

Finally, the groups presented their ideas. After that, the problems found in the workshop and their solutions were compared to the results found in the interviews. Some examples of the findings listed below.

Ideas of the visions for the Future sustainable food system:

- Popularization of scientific information to be available (wrong data and assumptions can be cut of, when shared research data)
- Research institutes to check the facts in the media
- Environmental / biology skills more in farmer training
- Project information / consulting
- Tailor-made farm-specific advice
- Coworker, apprentice, mentoring
- Example farms + visits
- Monitoring: digital meters
- Certifications and other labels for consumers to know more about products

Creative ideas were introduced also in the Future Workshop:

- Reality TV Program: Good food from the municipality (pilot municipality)
- Online Game: Spot and bite carrots (Angry Birds Game Type)
    - Understanding of the food for the people
    - At the same time, it would improve air quality when cultivating food in large cities

7. Collection of feedback

At the end of the workshop the participants gave written feedback on the forms (attached to Appendix 8).

6 Discussion

The thesis identifies key problems in the food production chain related to the Baltic Sea and how various operators in the chain experience these problems. It reveals how much the operators know about sustainability in a context of food and the Baltic Sea, and how they think the subject is known in general. The thesis also offers ideas on how to solve the found key problems. The actors represent corporate, public, education and civil operators. All in all, the thesis helps to analyze and define the state of the Baltic Sea caused by the food production.

The purpose is achieved by analyzing literature about the food system and the Baltic Sea and interviewing specialists of the field. This study gathers extensively thoughts from the operators, who are involved in the processes of the food sector in very different roles. The limitations of the study are introduced in the methodology chapter.

In general, the topic on the food system and the Baltic Sea consists of many kinds of problems, which are mostly complex. Sitra (2016 and 2017) has studied the sustainability of the food system from a future perspective. Appendix 10 shows Sitra´s ideas about how to change the Finnish food system in the future. The circular economy has been seen as a prerequisite for a more sustainable economy in the future.

Next, examples are presented of findings from both this study as well as from other literature or in the media.

Agricultural actions are in key role to prevent pollution of water systems

As presented in part 2.2.4 Turtola, E. et al. (2017) published a report where they show that the use of nutrient balances in agriculture can benefit both crops and the environment. In addition, the nutrition-based guidance was identified as a consideration of the saturation level, could stimulate farmers to do better basic improvements in the fields. These findings should be taken in consideration in the governance. In this study most of the representatives said that the state of the fields and the acts done in fields are the key aspects to prevent pollution of the Baltic Sea.

Baltic Sea Action Group is highlighting that the recycling of nutrients is key in order to ensure sustainable food production and save the Baltic Sea (BSAG 2017). This same aspect was found nearly all the interviews in this study. This has been raised now also to one of the key projects of Finland's government. Bio economy and clean solutions and in that the Breakthrough to a circular economy and adoption of clean solutions. The main functions there are: A) Experiment, research and development projects, demonstration projects and to promote circular economy, B) Water Management Plans and the Maritime Action Plan, C) Remediation and experimentation program for contaminated land, D) Accelerating Cleantech Solutions (Finnish Government 2017).

Field practices are one of the key elements affecting to the eutrophication of the Baltic Sea. In fertilizer efficiency, the correct amount of fertilizer, the timing and the place are essential, which all require accurate monitoring and the application of versatile cultivation methods. Nutrient application rates should be based on crop needs and the monitoring of soil to crops of useful nutrient inputs. It should be remembered that nutrient recycling or nutrient limitations do not in themselves resolve the state of the water or the efficiency of nutrient use, but all the above and other good farming practices combined with the latest knowledge and technology.

Good meters and monetary values for complex aspects

Giving monetary values for new aspects and for non-monetary aspects can help to see the context of complexity. There can be done large-scale changes in Finnish domestic incomes by using new methods. Seppälä et al. (2016) calculated some examples of impacts on gross domestic product if new methods are used:
- Reduction of food losses, 226 million €,
- Domestic production of fish meat, raising fish farming 233 million €,
- Cultivation of beet sprouts 82 million €.
- Improving the nutrition cycle and increasing biogas production and traffic usage, -4 million €, that was only negative due to additional investments needed in the sector

Many interviewees were thinking of these aspects to be good solutions and most said that the good measures are important for better and deeper understanding. When complex aspects are done tangible then it is understandable.

Management of the company's environmental aspects

One of the key to solve the problems is to begin in a company level by managing the environmental aspects and risks. This means the estimation of the key elements and show the measures and their use. One good example company of managing company's environmental aspects is the Apetit Oyj. They have made a clear report of their environmental aspects management. They use a life cycle model that includes the environmental impact assessment and management of the food chain (Apetit 2016).

Level of knowledge and price structures in the food system

Ilkka Hemmilä wrote 24.9.2017 in newspaper Maaseudun Tulevaisuus about how much people know that food producers earn only a small piece of the total price of the final product. Picture in Appendix 8 show examples of the price formation in Finland. For the news five people were interviewed in Helsinki center and most of the interviewees had some idea how the prices are formed but all were surprised that the situation is so weak for the all producers. Interviewees were not sure how to fix the situation but they all thought that buying more Finnish and near produced food will help. News was in line with the findings of this study. Most of the consumers do not have enough knowledge about food system and they do not know how their choices are affecting to the food system and the money distribution.

As the Hyrylä´s (2016) report found that the prices of food have been fallen and the competition tightening have been rising in recent years, also in this study those same aspects can be found as a major problems that operators in all parts of the food production system are concerned about. In the other side in both reports, Hyrylä (2016) and this, the one good solution idea to solve problems of the food sector are the industry investing in streamlining production and renewing its operations. Especially this have been already used in many cases of the food industry, but it should be used more in all sectors and the continuation of these changes are important.

The high power of wholesalers and central markets

As the Hyrylä (2016) report also highlights there are only a few competitors in food market sector and in wholesales. They can dominate the whole sector, prices, competition and trends. This was also one of the concerns of the operators of the field in this study. Already 2009 in the report of IAASTD was one concern the market concentration. The problem is found globally but it is highly found in the Nordic countries (Hyrylä 2016) (figure 18).

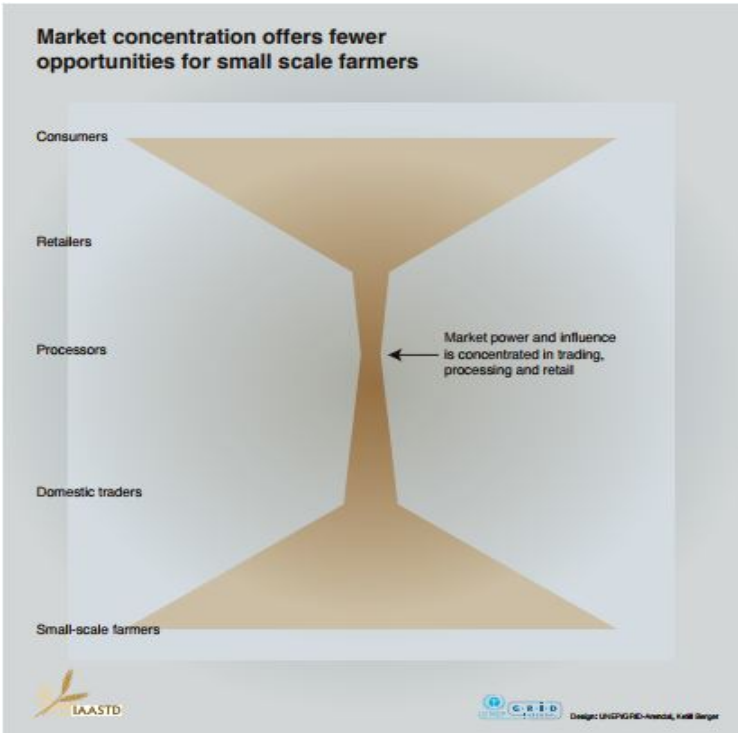

Figure 18: Market concentration offers fewer opportunities for small-scale farmers by IAASTD 2009.

Incompatibility of Income

One of the highest worries found in key problems was the low producer prices. It can be shown to be true by the statistics of Forkful of Facts (2017). Most of the food products are giving less income price for the producer than year before. The prices cannot be viewed straight because the inflation is affecting so that the same price is worth of less than earlier. However, the line of the profitability coefficient of the Finnish farms in the monitoring period of 2001-2014 can show clearly that the profitability have fallen. At the same time the grocery store level have been risen. Now in recent years, because of the recession, the growth have been slow but it is estimated to rise again soon (Kauppa.fi 2017). Still the producers' prices are estimated to be low or fall (Forkful of Facts 2017).

Information distribution and the Future of knowledge

Based on Luke (2017b) statistics, farmers´ three most important sources of information are 1. advisory and producer organizations, 2. professional journals and websites, and 3. other farmers and entrepreneurs in the field. These Luke statistics support findings of this study that the distribution of knowledge is limited and the information from the research is reaching the operators of the agriculture and horticulture only partly.

In the Interactive WAter MAnagement Seed Project (2015) was found: "Knowledge and education are key points to successful operation of wastewater treatment. Modern processes are based on sufficient technology investments and skillful operation." These results are similar than in this study. Knowledge, education, execution and new technologies are keys to sustainability.

The world is full of information, but we should be able to use it better so that we can optimize the use of resources and increase transparency. Could there be possibility to interconnect human thinking and technology in the Future (Sitra 2017).

Ion Yarritu and Helena Matute found in their study 2015: “Knowledge-based expectations affect the development of causal illusions by the mediation of behaviour, which biases the information received.” Taking this result of study in the account we need to remember that the knowledge of the people is always partly affected by confirmation bias. Some interviewees were also worried about this topic and they assumed that the knowledge base is more affected by confirmation biases than before and the trend is unlikely upwards.

Connection between politics and science

In the comments of the interviews were risen many concerns about the weak distribution of the scientific information for the public and the politics. In the research of Pihlajamäki and Tynkkynen (2011b) was found that there are many reasons why the scientific information is not reaching the politics. They found that environmental problem phenomenons could not be captured by any unambiguous scientific facts, because even the phenomenon thought to be understood, there could be found another challenging point of view of the topic. Therefore, the political decisions are made only partly based on the scientific knowledge. Those same not scientific forces are also affecting to the scientific knowledge itself in any case. The understanding of these force and counterforce in the knowledge constructions should be taken more seriously to account.

Public awareness and joint operations

The Commitment 2050/ Sitoumus 2050 is an open data base where organizations, businesses and private persons may develop ideas of and make operational commitments to sustainable development. Ready-made commitments are published on the open data base. The Finnish National Commission on Sustainable Development, secretariat, and an expert panel follow and support the commitments and their progress. There are now nearly 700 commitments to have more sustainable Finland. It is in line with the ideas of solutions found in this study too. It is important to take all the operators engaged to make more sustainable actions in all levels. Both enterprises and citizens should be encouraged starting from the government level.

Climate Change

Climate change will increase weather variation and extreme phenomena, as well as their multiple effects on agricultural production. Future farmer needs hard skills, financial buffers and

ways to maintain and grow production potential (Peltonen-Sainio et al. 2017). Many researches forecasts the special features of the Baltic Sea may disappear as climate changes. Climate-guide.fi collects the estimated an alternative Future realization (Ilmasto-opas.fi 2017). Climate change is prerequisite for boosting nutrients that drain water will flow to water bodies (Kuusisto & Käyhkö 2004) also some of the representatives of this study were worried about the effects of the climate change for the Baltic Sea.

Project events as a way to rise the knowledge of the good practices

Most of the interviewees in this study said that the project acts and advisory to encourage to experiment for farmers is one of the keys to solve problems in the field of food system sustainability. Sensible agriculture is what Järki-project is teaching. It is important that there are these kinds of actors and farmers have found it good to have these kinds of ways to learn (Järki 2017).

New technologies help to solve problems

One of the solution idea found in the interviews was to have new technologies for Future to plan, optimize and analyze. Many researches are trying to find solutions for this. Here are some examples of the Future technologies in research.

GIS (geographical information system) can help to plan in Future. Spatial data analysis methods can be used to analyze the success of European nature conservation programs. Aija Kukkala used methodology in her dissertation and stated that GIS can be used well as a tool to planning and analyzing (Kukkala 2017).

Robotics are coming in near Future. In the Future there can be field robots to optimize the cultivation. Already some are under tests. In Finland at least Aalto University are having test for the field robots already over 10 years (Oksanen 2017).

Our current eating habits must be questioned. What kind of food are the principles of the rotational economy, however, so that eating is tempting and meaningful? (Sitra 2017)

Media, truth or false news

Hannigan (1995) explained six general conditions for being socially a major problem and the conditions for solving it are:
• There must be sufficient scientific knowledge behind the environmental problem authority and assertion of claims.
• Above the gap between scientific and practical environmental protection activities the existence of popularizers is important.
• The problem must be framed in public as both real and essential.
• The problem needs to be dramatized. Especially in the media reality controlled by the television, it is important that problems can be presented symbolically and visually.
• Financial incentives must be found to solve the problem.
• There must be an institutional sponsor with sufficient resources and resources persistence to keep the problem open and to find political solutions order.

In today the situation have been changed because of the social media and because of it, the total change of the importance of truthfulness of information in media (Sjöman 2017, Nikunen 2017). It is more important to have the true and critical media literacy (Mediakasvatus.fi 2017).

In this study, many interviewees were worried about this topic. Many did not have high trust and confidence to media.

Well-functioning meters to help to make acts effects visible

One of the solution ideas was to have more visible meters to indicate the effects of actions. FIBS report explains that it is hard to give monetary value for important issues such as biodiversity. An international initiative called The Economic of Ecosystem and Biodiversity (TEEB) has calculated still the measures for some assets of the biodiversity. For example for Finland, they have calculated that the value of the annual imputed fishing is 25 million euros (FIBS 2015). When looking at these numbers calculated, can be estimated the negative monetary effect of e.g. the eutrophication or other pollution of waters.

Balance of the economics, ecology and the social side

Redefining values are the Future. Measuring business success only by through financial metrics is over in near Future. Some companies have found it already. In the optimistic vision all companies will measure, value and report their true value, true costs and true profits in near Future. To reach this vision, companies need to take an integrated approach, via a better understanding of how to incorporate and account for their natural and social capital as well and not only just accounting for financial capital (WBCSD 2017). The same kind of ideas were found also in this study. The balance of the economics, ecology and social capital is vital for more sustainable tomorrow.

International operations of co-operation

Pihlajamäki and Tynkkynen introduced in their report: Governing the blue-green Baltic Sea (2011a) four sets of measures: 1) a macro-regional, binding, cost-effective and fair agreement on the protection of the Baltic Sea from eutrophication, 2) the spatial and temporal specification of policies, 3) the more effective and through integration of different policy sectors and 4) increasing publicity, environmental awareness and deliberative democracy.

The Future of Symbiosis is coming describes Sitra (2017). The systemic change in our food systems does not occur at the initiative of individual players. We need new kinds of networks and collaborative ways to create more sustainable food systems. How can you find new partners and expertise? How can we find inspiration for the necessary symbiosis?

All these aspects were found also in this study. These actions should be taken into action more reliably, visible and in small- to large-scale from the local to the world level.

7 Conclusion

The thesis identified key problems in the food production chain related to the Baltic Sea by twenty-six interviews of the experts of the topic. Operators´ experiences of the chain were studied. In addition, solutions to the key problems were gathered. Interviewed actors were corporate, public, education and civil operators. Consumers were not interviewed in the study. The study introduced background information of the current status of the Baltic Sea and the water bodies along with the current situation of the Finnish food sector.

In the study, fifty key problems and forty-five solutions were found. The analysis pointed out that there were differences between actor groups on their thoughts about the key problems. Though, only a few differences were statistically significant. The most common key problems arised the interviews were: 'weaknesses of the knowledge', 'the information distribution weaknesses', 'long-term actions lacking', 'lack of co-operation', and 'the balance of the economical, ecological and social sides'. The most common ideas for solutions were: 'increased co-operation', 'concrete measures and actions', 'political control in the direction of sustainability', and 'new research and innovations'.

A Future Workshop was organised based on the findings from the interviews. There were intensive discussions and those resulted into some new innovative ideas.

The findings in this study are in accordance with a wide range of studies done in this field of research about food and the Baltic Sea. All actor groups, in the other words, farmers, companies, administration, research and civil society organizations, have a desire to make changes in food system. They want to make it more sustainable and cleaner for the water bodies.

The food system consists of many complex aspects, such as, various aspects of agriculture, politics, economic and social factors. All those affect the decisions, actions, results and analyses. One or two aspects are not sufficient enough in defining the relation between the food system and the Baltic Sea. It is important to understand the versatile when making the decisions, actions, results and analyses (figure 19).

Figure 19: Key words of solutions.

This study did not include consumers in the interviews because the focus of the study is in the beginning of the food chain. It is clear that they have strong effect on the food system. In the interviews, the experts highlighted that the consumers' choices, valuation, leavings, refuses, etc. have even a stronger effect on the whole ecological system that is understood.

The importance of the consumer could be rising in the future. Therefore, the consumers should be taken into account in all parts of the food system, especially, from the point of view of sustainability of the food system, knowledge bases of consumers, co-operation, and circulation economy. It would be worthwhile to carry out a study interviewing a wide variety of consumers. It could also be beneficial to compare the thoughts of consumers to those of different groups of operators such as in this study.

We should rethink the processes in our food systems. Food should be nutritious and sufficient for all, but produced at the same time without causing harm to the environment. A clear indicator would be: How does your own knowledge capital help you succeed better with your current strategy or should you change something? Thinking, continuous improvement will help to create something new.

The listed points below promote success when achieving a sustainable and Baltic Sea -friendly food system:

- **Define clear objectives and the strategy**
- **Ensure a sufficient level of knowledge in all levels of operators in the food chain**
- **Identify the key processes needed to achieve the goals**
- **Decide on which processes to develop**
- **Engage all the operators to the common goals**
- **Ensure that the results obtained are also analysed to ensure realization**
- **Balance of the economy, ecology and social aspect**
- **Promote co-operation**

It is possible to improve the status of the Baltic Sea. Concrete actions together with all operators, including consumers are needed. The food system can be more sustainable in the future if there is a common will for improvement. We need clear visions, understanding and meters for analysing. When the knowledge base is higher and all the actors understand their role, we can have a more sustainable future with clear waters and healthy, nutritious food.

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Figures

Tables

Appendices

Appendix 1: The questionnaire list used to support the interviews / Kysymysaihioluettelo, jota käytettiin haastatteluissa tukena (Original in Finnish)

Kysymyksien aihioita teemahaastatteluihin:

Teemahaastatteluiden kysymysrunko:

Haastateltavan tausta

Valinnat

Kestävä ruoantuotanto

Kestävyyskulttuuri

Haastateltavan tausta

1) Kuvaile työtäsi/toimintaasi?
2) Mitä sinulle tulee mieleen aiheen ympäriltä – Ruuantuotannon vaikutukset Itämereen?

Valinnat

3) Yleisistä valintaan vaikuttavista tekijöistä
   A) Minkälaiset asiat ajattelet vaikuttavan keskiverrosti eniten valintoihin? (PESTE-viitekehys kokonaiskuvan hahmottamiseksi: poliittiset, ekonomiset, sosiaaliset, teknologiset, ekologiset)
      a. Poliittiset ja Lailliset
      b. Ekonomiset eli Rahalliset
      c. Sosiaaliset, mm. tietämättömyys, perinteet, eettiset
      d. Teknologiset ja Tekniset
      e. Ekologiset eli Ympäristötietoisuus ja Vastuullisuus
   B) Onko mielestäsi joitain toimijaryhmiä, joihin erityisesti vaikuttavat jotkin seikat? (Esim. yrittäjät, kunnat, kansalaiset)

4) Sinulla (Miten arvioit omien toimiesi vaikuttavan Itämereen?)

   Minkälaiset vaikuttavat eniten valintoihin? (PESTE-viitekehys kokonaiskuvan hahmottamiseksi: poliittiset, ekonomiset, sosiaaliset, teknologiset, ekologiset)

   a. Poliittiset ja Lailliset
   b. Ekonomiset eli Rahalliset
   c. Sosiaaliset, mm. tietämättömyys, perinteet, eettiset
   d. Teknologiset ja Tekniset
   e. Ekologiset eli Ympäristötietoisuus ja Vastuullisuus

5) Onko jotain mitä voisit tehdä toisin, mitä ja miten? (voi pohtia voiko jotain tehdä enemmän/vähemmän ja yksin/yhdessä)

6) Jos on niin, mitä esteitä toiminnalle on?

Kestävä ruoantuotanto

7) Mitä asioita kestävän ruuantuotannon taustalla pitää olla? (PESTE-viitekehys kokonaiskuvan hahmottamiseksi: poliittiset, ekonomiset, sosiaaliset, teknologiset, ekologiset)

8) Miten näet yleisesti toiminnan alallasi?

9) Entä ruokaketjussa? (Voidaan avata ruokaketjun termiä, mikäli tarvetta)

   A) Mitkä ovat mielestäsi avainongelmia?

   B) Kuka on mielestäsi vastuussa?

10) Mitkä ovat keskeisiä mittareita kestävässä ruuantuotannossa? Entä Itämeren rehevöitymisessä? Entä Itämeren suojelussa?

11) Miten johdon tulisi käsitellä Itämereen liittyviä asioita säännöllisesti / ajoittain?

   a) Yritys
   b) Kunnat
   c) Hallitus
   d) Yhdistykset
   e) Kansalaisjärjestöt

Kestävyyskulttuuri

12) Miten kestävyyskulttuuria voidaan arvioida ja mistä tekijöistä tunnistaa hyvän tai huonon kulttuurin? (PESTE-viitekehys kokonaiskuvan hahmottamiseksi: poliittiset, ekonomiset, sosiaaliset, teknologiset, ekologiset)

- 13) Mitkä rajoittavat yksilöä, yritystä, järjestöjä, opetusta, kuntaa, hallintoa, valtiota, valtioiden yhteistyötä toimimaan järkevämmin?

14) Mitä kestävyyskulttuurin kehittäminen edellyttää (PESTE-viitekehys kokonaiskuvan hahmottamiseksi: poliittiset, ekonomiset, sosiaaliset, teknologiset, ekologiset)

a. Yksittäiseltä yritykseltä?

b. Yrityksiltä yleisesti?

c. Yksittäisiltä kaupungeilta/kunnilta?

d. Valtiolta?

e. Yksittäisiltä kansalaisilta?

f. Koko kansakunnalta/-kunnilta?

15) Miten toimijoiden toiminta vaikuttaa ruokaketjun Itämeren kestävyyskulttuurin kehittämiseen?

16) Miten toimijoiden osaaminen vaikuttaa ruokaketjun Itämeren kestävyyskulttuurin kehittämiseen?

17) Mikä on olosuhteiden vaikutus kestävyyskulttuuriin ja miten siihen vaikuttavat toimijoiden osaaminen ja teot?

18) Miten toimija voi kehittää osaamistaan kestävyyskulttuurista?

a. Yksittäiseltä yritykseltä?

b. Yrityksiltä yleisesti?

c. Yksittäisiltä kaupungeilta/kunnilta?

d. Valtiolta?

e. Yksittäisiltä kansalaisilta?

f. Koko kansakunnalta/-kunnilta?

19) Tuleeko sinulle mieleen yksittäisiä koulutuksia tai kehittämistoimia nimeltä?

20) Miten itse otat huomioon omassa toiminnassasi kestävyysasiat?

21) Mikä merkitys viestinnällä on kestävyyskulttuurin kehittämisessä?

22) Mitä yksittäisiä työkaluja toimijoilla on kestävyyskulttuurin tunnistamiseksi ja kehittä-
miseksi?

23) Eroaako kestävyyskulttuurin kehittäminen elintarviketeollisuudessa muihin toimialoihin nähden ja miten?

24) Mitä kestävyyskulttuuriin liittyvää asiaa yrityksessäsi/toimissasi tulisi kehittää juuri nyt ja miten? Mikä kannustaa nyt tekemään paremmin? Mikä kannustaisi tekemään?

25) Oletko kuullut Tools for water protection eli Työkaluja vesien suojeluun (Itämerihaaste)? Oletko käyttänyt työkaluja?

26) Onko sinulla jotain hyväksi koettuja käytäntöjä tiedossa?

27) Onko sinulla ajatuksia ratkaisuista näihin ongelmiin?

Appendix 2: Saateviesti haastatteluun pyydetyille / The letter of invitation to the interview (Original in Finnish)

Hei,

olen Riina Kärki, maatalous- ja metsätieteen maisteri ja agronomi Helsingin yliopistosta sekä viimeisen vuoden business management -koulutusohjelman opiskelija Laurea-ammattikorkeakoulusta. Teen tällä hetkellä tutkimusta opinnäytetyötäni varten.

Tutkimukseni aihe on ruuantuotannon vaikutukset Itämereen ja tarkoitus on löytää pääongelmakohtia eri yhteiskunnan toimijoiden näkökulmasta tähän ongelmaan sekä ratkaisuideoita avainongelmiin (Tutkimukseni nimi: The eutrophication effects of The Baltic Sea caused by food production - Key Problems and solution ideas). Tutkimus on osa hanketta: FuturesLab CoFi Laurea, Tulevaisuuden vesiliiketoiminta – vesi nyt ja tulevaisuudessa (Kehä-hanke EAKR 9/2016-8/2018). Voit tutustua lisää: http://cofiblogi.blogspot.fi/p/Futureslab-cofi-tarjoaa.html

Tavoitteenani on haastatella noin 20 henkilöä, jotka edustavat eri toimijoita ruoantuotannon alalta ja rajauksena on Uusimaa. Haastatteluiden pituus on noin puoli tuntia – tunti. Riippuen haastateltavan toiveesta, haastattelussa voi pysyä anonyyminä. Toimijat on jaettu neljään eri kategoriaan: 1. yritystoimijat, 2. julkinen sektori, 3. tutkimus-, kehitys- ja koulutustoimijat, sekä 4. kansalaiset, kansalaisjärjestöt ja edunvalvojat. Lähestyn sinua, koska koen sinun edustavan _____ kategoriaa erinomaisesti. Olisiko sinun siis mahdollista olla yksi haastateltavistani?

Haastatteluista nousseiden aiheiden pohjalta pidetään syksyllä tulevaisuus verstas, jossa tavoitteena on ideoida ratkaisuehdotuksia löytyneisiin avainongelmiin. Ideoita käytetään apuna mahdollisuuksien mukaan tulevaisuuden ratkaisuissa sekä tutkimuksissa. Olet tervetullut tulevaisuusverstaaseen ideoimaan. Tulevaisuusverstas järjestetään 29.8.2017 Laurean Leppävaaran kampuksella.

Mikäli kaipaat lisätietoja tai haluat muuten jutella, kerron mielelläni sähköpostilla tai puhelimitse.

Appendix 3: Based on the study material, ideas about the frames of the sustainable food production / Tutkimusaineiston perusteella ajatuksia kestävän ruoantuotannon raameista.

Kestävän ruoantuotannon taustalla:	
luonto, talous ja ihmiset	
ekologisuus	
sosiaalinen reiluus	
oikeudenmukaisuus	
taloudellisesti toimeentulo viljelijöille (taloudellinen kestokyky), balanssi tuottajan toimeentuloon	
hinnan suhde	
poliittinen ohjaus	
kierrätys	
ympäristöstä välittäminen (luonnon kestävyys pohjana), edellytys puhtaalle ruoalle	
puhtaan veden saanti	
luottamus suomalaiseen ruokaan	
turvallisuus tärkeää, riskit pitää tiedostaa ja hallita	
Resurssitehokkuus on myös ympäristötehokkuutta	lannoitus sinne, minne pitää ja oikea määrä
	ei näennäisviljelyä
	karja sellaiseen käyttöön, että ei vie ruoraan ihmisravintoa, esim. soija ja leipävilja ei rehuksi vaan suoraan ruuaksi
ainevirtojen kierto	
myös luomu ja sen lisääminen	
luonnonmonimuotoisuuden edistäminen	
hyvinvoivat eläimet tärkein asia	
lohkokohtaiset toimenpiteet	
viljelykierto	
isompi skaala mukana ajattelussa	
toimiva politiikka taustalla, määritelmät ja niiden toteutus tulee olla kunnossa. Valvonnalla myös merkittävä rooli.	
tietoisuus koko ketjun yhteyksistä	
yhteiskunnan valinnoilla voidaan vaikuttaa toimijoihin	
Pyritään parantamaan maan kuntoa	
Ulkoisvaikutusten minimointi (mm. monimuotoisuus., ilmasto ja maisema)	
kestävä luonnonvarojen käyttö	

hyvää ja terveellistä ruokaa
torjunta-aineiden turvallinen tutkittu taso
pitkäjänteisyys liiketoiminnassa
osaaminen
kestävän ruokavalion ja -tuotannon viitekehys
tuonti ja vienti tulisi olla balanssissa, esim. soija on kyseenalainen
talous ja sosiokulttuuri sekä ympäristö
miten perusruokaa voidaan tuottaa paikallisesti kestävästi?
reilu kauppa ja ketju
ruokakulttuuriset seikat tulee ottaa huomioon, yhteiskunta yhä monikulttuurisempi
monipuolinen maisemarakenne, johon kuuluvat eläimet
monipuolinen omavaraisuus
yhteinen ymmärrys, kaikkien vastuista ruokaverkossa
peltojen hyvä hoito, kasvukunnon takaaminen
tekijöiden hyvinvointi
riittävä aikaperspektiivi, pitkän tähtäimen ajattelu

Appendix 4: Miten mitataan kestävyyttä? (olemassa olevia mittareita ja ajatuksia, millaisia voisi olla), prosenttiosuus (%) 26sta haastattelusta/ How to measure sustainability? (Excisisting meters and thoughts of the possible meters), percentages (%) of the 26 interviews.

Kestävyyden mittarit:	**% 26sta**
Veden N ja P (ravinnetaso)	38%
Ravinnetaseet (myös porttitaseet ja lohkotaseet)	35 %
Tuotannon tehokkuus, huomioiden käytetyt resurssit (esim. satotasot, mittaa sadon määrää vs. ravinteet peltoon)	23 %
Veden tila yleisesti	23 %
Hiilijalanjälki	19 %
Ymp. ohjelmien toteutus osuudet (sitoutuminen tukien toteutukseen, myös toimenpiteiden toimivuutta tulisi mitata)	19 %
Indikaattorilajit (biodiversiteetin tila)	15 %
Energian käyttö (paljonko energiaa käytetty per tuotettu määrä)	15 %
luomun osuus	15 %
Levien määrä	12 %
Miten paljon fossiilisia/uusiutumattomia käytetty	12 %
Jätevesien mittaus	12 %
Veden käyttö (paljonko vettä käytetty per tuotettu määrä, hiilijalanjälki)	12 %
kemialliset parametrit vedestä	12 %
biologiset parametrit vedestä	12 %
luonnonmonimuotoisuus	12 %
Näkösyvyys	8 %
Indikaattorihabitaatit	8 %
Päästölaskurit	8 %
Typen käyttö pelolla (paljonko N käytetty per tuotettu määrä)	8 %
Fosforin käyttö pelolla (paljonko P käytetty per tuotettu määrä)	8 %
eläimet sisällä vs. lehmä ulkona	8 %
kg/hehtaari (käytössä, muttei kerro kunnolla kestävyydestä)	8 %
jätteiden määrä ja laatu	8 %
lannoitteiden määrät ja tyylit pellolla	8 %
ruokahävikin määrä	8 %
kierrätysaste	8 %
suomalaisen ruuan osuus	8 %
ympäristömerkit, kriteeristöt ja sertifikaatit	8 %
sukupolvien vaihdosten määrä	8 %
kansalliset valumat (myös muut Itämeren valumat, kuten Venäjä ja Puola)	8 %
Maaperän fosforiluku	4 %

Typpitase	4 %
maitoa/lehmä (käytössä, muttei kerro kunnolla kestävyydestä)	4 %
Tehotuotantomittari	4 %
Turvallisuus	4 %
valumamallit (erityisesti ongelma-alueilla, tuloksia ei saisi yleistää)	4 %
eliöstön tila	4 %
happipitoisuus vedestä	4 %
eläinten määrä	4 %
tilarakenne	4 %
lannankeräys	4 %
life cyckle assesment	4 %
tuotteen elinkaari	4 %
kasvipeitteisyys	4 %
suojavyöhykkeiden määrä	4 %
turhien pakkausten määrä	4 %
asukkaiden määrä/roskien määrä	4 %
valintojen mittaus (kulutustutkimukset valintojen perusteella, onko päätöksen takana aina raha?)	4 %
paljonko valtakunnallisia tavoitteita	4 %
kemikaalien käytön määrä	4 %
eroosioherkkyys maaperässä	4 %
HELCOM indikaattoreita	4 %
EU:n mittareita ja strategioita	4 %
Itämerilaskuri	4 %
kuormituksen määrä/tuotettu proteiini	4 %
kasvis- vs. liharuokavalio	4 %
tuotettu kilo/päästö	4 %
tuotantotavat	4 %
paikallisuus	4 %
eettisyys	4 %
reiluus	4 %
ruuan riittävyys ja saatavuus	4 %
energian omavaraisuusaste (tilakohtaisesti kuin kansallisestikin)	4 %
ravinteiden omavaraisuusaste (tilakohtaisesti kuin kansallisestikin)	4 %
alueellisesti tärkeät mittarit	4 %
YVA check list	4 %
ympäristövaikutukset kaikkiaan	4 %

Appendix 5: The basis for grouping of the clusters of themes found in the interview Haastattelussa löytyneiden teemojen klustereiden ryhmittelyn perusta

Avainongelmat / Key problems

Tietotasonheikkous
Kuluttajien tietotaso keke ruoasta ja ylipäätään maanviljelystä heikko
Yritysten tunnistaa keskeiset Itämeri vaikutuksensa ja sen mukaan toimenpiteet
Innovaatioiden ja tutkimuksen ymmärrettävyys jokamiehelle
Ruokaverkko ymmärrys heikkoa, kaikki vaikuttavat siinä
Osaamisen taso ei kaikilla riittävä
Taloudellisen kestävyyden ajattelu puuttuu
Alueelliset erot ymmärretään verrattain huonosti
Innovaatioiden ja tutkimuksen ymmärrettävyys jokamiehelle
Yhteistyonpuute
Yhteistyö eri toimijatasojen välillä ei riittävää
Syyttely -> ei keskustella
Intressiristiriidat (vastustus ja vahvat mielipiteet)
Taloustilannehuono
Taloudellinen tilanne heikko kokonaisuus
Kuluttajien ostovoima ei korkea
Taloudellinen tilanne heikko tilallisilla
Yksittäisten tilallisten ja pienyrittäjien tasapainottelu sos, ekon, ekol.
Taloudelliset intressit (rahattomuus tai ahneus)
Lyhytnakoisyys
Poliittiset päätökset lyhytnäköisiä
Pitkän aikavälin panostus heikkoa
TKpuutejajalkautus
Tutkimustiedon jalkautuksen hitaus/katko
Puuttuvat teknologiat ja toimintatavat
Tiedon tulvan ähky, mitä tulisi seurata
Ympäristötutkimus on erillään muusta biologian ja maatalouden opetuksesta

Tuotteistamisen heikkous
Tilanpaatoksetjamaataloustoimenpiteet
Vuokramaa
Ravinteiden kierrätys
Pellon kasvukunto
ns. Roskakalojen hyödynnysaste heikko
Hajapäästöt kuriin
Pistekuormakohteet kuriin
Suomen haasteelliset viljelyolosuhteet
Politiikanongelmat
Kotieläin/kasvintuot. Eriytyminen
Yksittäisten tilallisten ja pienyrittäjien tiukasti rajattu toiminta
Suomessa tuet sidottu karjan määrään
Pieni ryhmä päättää poliittisesti
Kaavoituksen ongelmat
Raskas byrokratia
Kasvavat tilakoot
Omavaraisuusasteen heikkous ja heikentyminen
Medianluomatkuvat
Luottamus tietoon
Median luomat kuvat eivät aina kohtaa todellisuutta
Keskusliikkeidenvalta
Halpa ruoka
Kova kilpailu
Tulojako
Keskusliikkeiden ja tukkujen valta
Ajattelemattomuus
Tottumukset ja perinteet vaikuttavat valintoihin

Helppouden hakuisuus
Välinpitämättömyys
Agronomian arvostus
Maantieteeseensidonnaiset
Pitkät välimatkat
Ilmastonmuutoksen tuomat lisäongelmat ja niiden arvaamattomuus
Fosforivarojen väheneminen

Ratkaisut ja ideat / Solution and Ideas

Yhteistyo
Yhteistyö
Vapaaehtoisten toimintaryhmien kannustus
Kansainvälinen yhteistyö
Viljelijöillä koneiden yhteikäytön lisäys ja urakointi
Viljelijä pitää olla mukana kaikissa päätöksissä ja valmisteluissa
TKjakoulutus
Voisi olla ohjeistus listaa, mikä vaikuttaa mitenkin Itämereen
Hanketoiminta ja neuvonta
Tutkitun tiedon parempi ja laajamittaisempi levittäminen
Seuranta ja toimivat mittarit
Julkishallinnon tietotaidon vahvempi käyttö
Yritysten tuotteistaminen
Viljelijöille rohkaistusta kokeiluun
Ympäristötietoisuuden lisääminen somen ym. median kautta
Koulutus perusekologiasta, ruuasta, kestävyystä ym.
Uuden teknologian kehittäminen ja käyttöönotto
Kansalaisten tietoisuus maanviljelystä tulisi parantaa
Kenttäkokeilla testaus

Edistavatmaataloustoimenpiteet
Maaperää parantavat toimenpiteet
Hoitokalastus
Lihan kasvatuksen avulla tehtävä hyvä
Ympäristövaikutus pitäisi näkyä lihan hinnassa
Näennäisviljely pois
Karjanlannan parempi hyödynnys
Tuotevalinnat
Kestävät hankinnat
Lähituotteet kunniaan
Sesonkiruokaan painotus
Ruokaosuuskunnat
Kestavatjalapinakyvattoimenpiteet
Läpinäkyvyys
Konkreettisia toimenpiteitä
Tavoitteellinen toiminta laajamittaisesti
Poliittinen ohjaus keke suuntaan
Kasvispainotteisen ruokavalion tekeminen helpommaksi
Ympäristöystävälliset ohjelmat yritysten sisällä
Tempaukset kansalaisille
Energian, veden ja resurssien käytön minimointi
Jatkuvan parannuksen periaate
Hävikkiruoka kuriin
Sertifikaatteja hyville toimille (standardisoitu)
Täsmäkeinoja
Teollisuuden tulisi tehdä konkreettisia uudistuksia
Resurssitehokkuusmittarit osana johtamista ja strategiaa
Elinkaarianalyysien hyödyntäminen
Taloudellisen kestävyyden ajattelu, balanssiymmärrys
Sitoumuksellisuus
Jätevedet hallintaan

Appendix 6: Statistically significant differences between groups in figures

Avainongelmat / Key problems

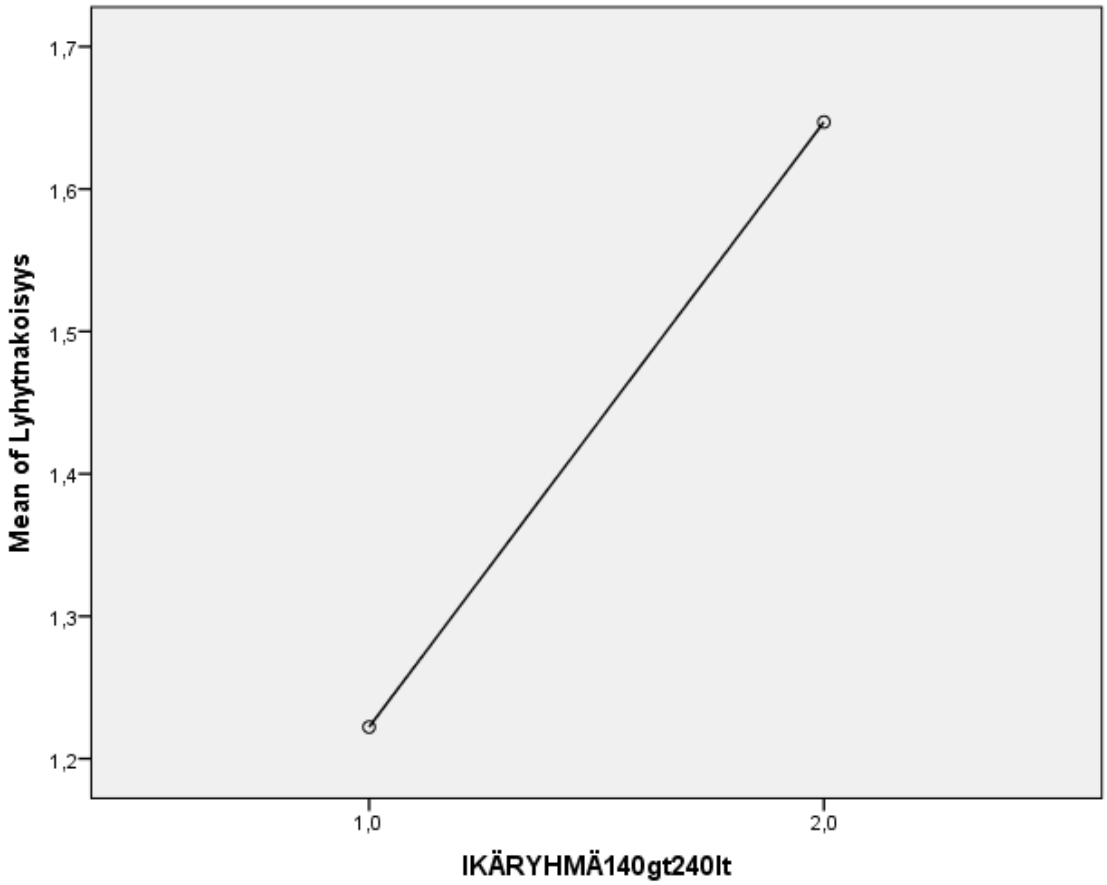


Figure A. Ikäryhmä ja Lyhytnäköisyys: Ikäryhmän 1 (alle 40 vuotta) ja 2 (yli 40 vuotta) näkemykset erosivat merkitsevästi (p=0,41) lyhytnäköisyyden merkityksestä. Vanhemmat pitivät lyhytnäköisyyttä päätöksissä haitallisempana kuin nuoremmat. / Age group and Short Vision: The views of age group 1 (under 40 years) and 2 (over 40 years) differed considerably (p = 0.41) from each other when looking at the short-sightedness. The older group considered the short-sighted decisions more harmful than the younger ones.

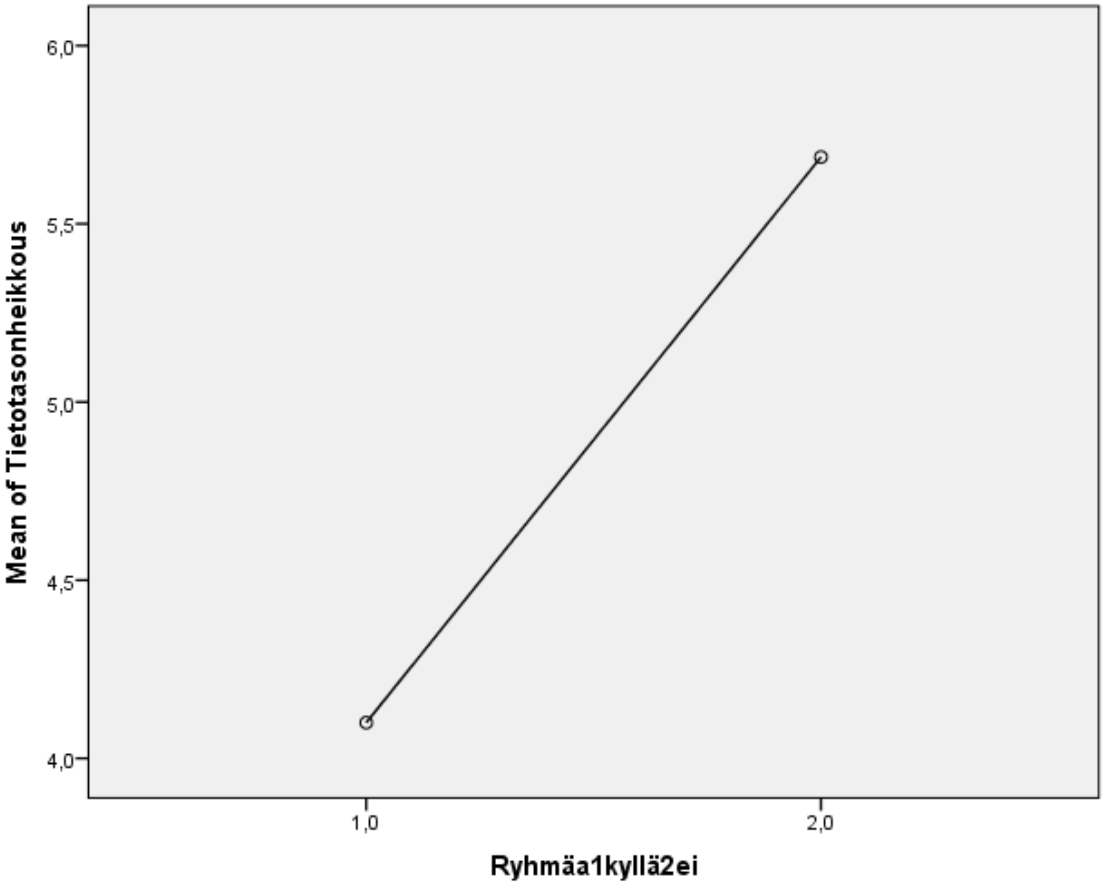


Figure B. Ryhmä a eli yrittäjät ja Tietotason heikkous: Yrittäjien ja muiden näkemykset tietotason heikkoudesta erosivat merkitsevästi (p=0,08). Tietotasoa pitivät heikompana muut kuin yrittäjät. / Group a, ie Entrepreneurs and Knowledge Level Weakness: Entrepreneurs and other people's views about the level of knowledge significantly differed (p = 0.08). The other operators thought the level of information was worse than those who were only entrepreneurs.

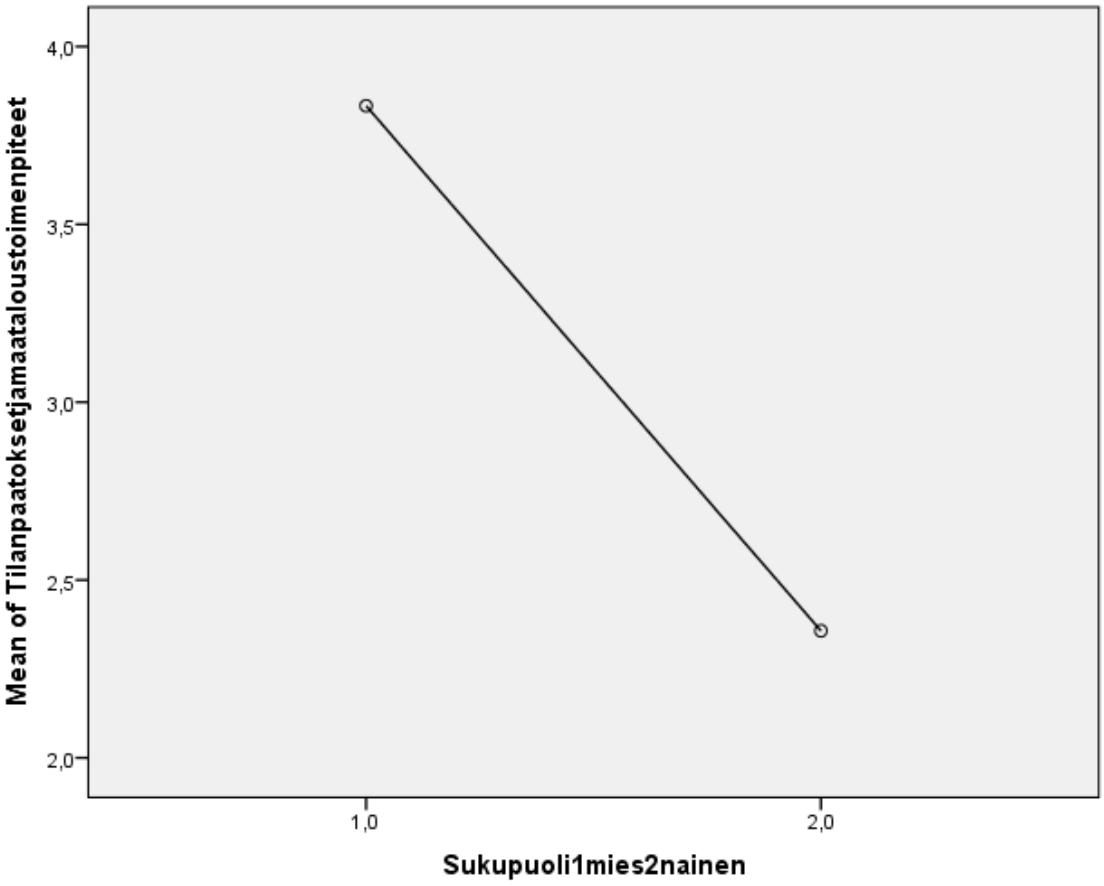


Figure C. Sukupuoli ja Tilan päätökset ja maataloustoimenpiteet: Sukupuolten välillä oli eroja siinä, miten vahvasti tilan päätökset ja maataloustoimenpiteet voivat aiheuttaa ongelmaa. Sukupuolten ero oli merkitsevä (p=0,015). Miehet näkivät naisia enemmän ongelmaa siinä, että tilan päätökset ja maataloustoimenpiteet ovat huonoja. / Gender and Farm Decisions / Agricultural Measures: There were differences between the sexes in how strong decisions made by the farm and agricultural measures can pose a problem. The gender difference was significant (p = 0.015). The men saw the problem, that farm decisions and agricultural measures are bad, more markable than women.

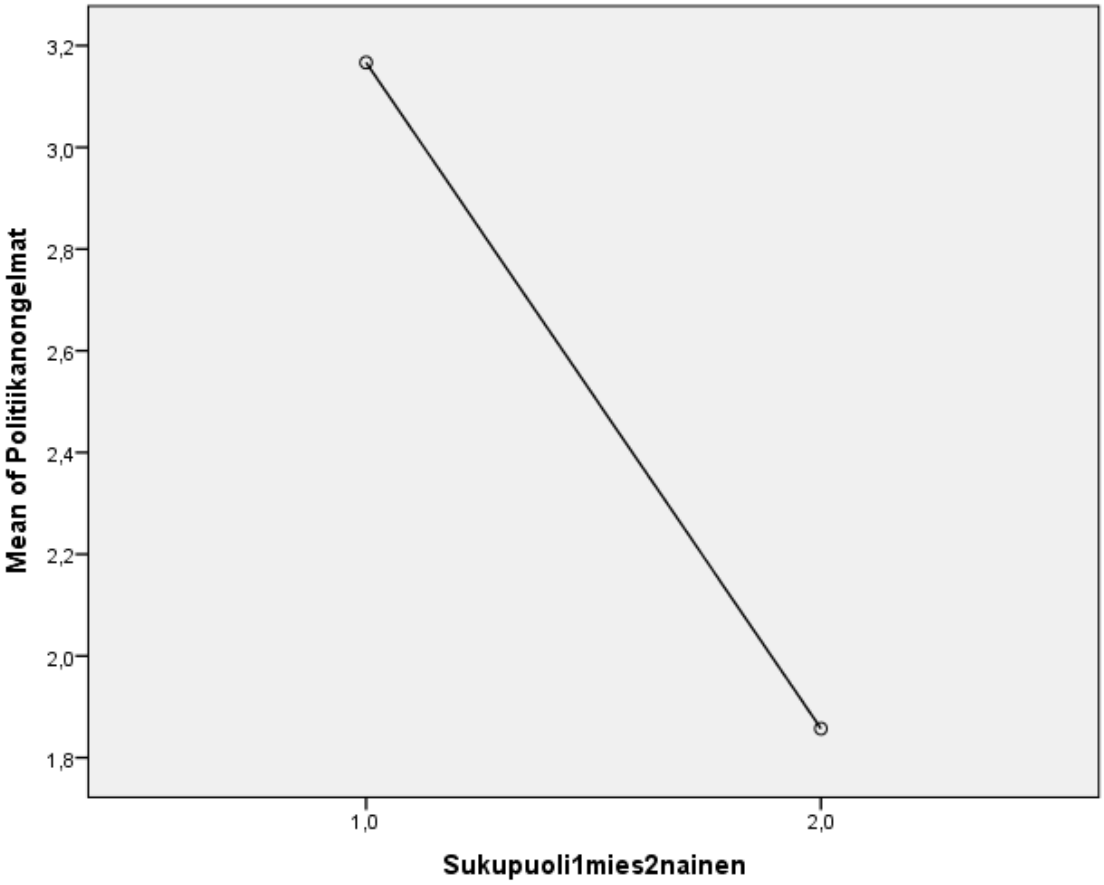


Figure D. Sukupuoli ja politiikanongelmat: Miesten ja naisten mielipiteet politiikan ongelmista olivat eroavat merkitsevästi (p=0,045). Miehet kokevat politiikan ongelmat suurempina kuin naiset. / Gender and Policy Problems: Men's and women's opinions on policy issues differed significantly (p = 0.045). Men are more concerned with politics than women.

Ratkaisut ja ideat / Solution and Ideas

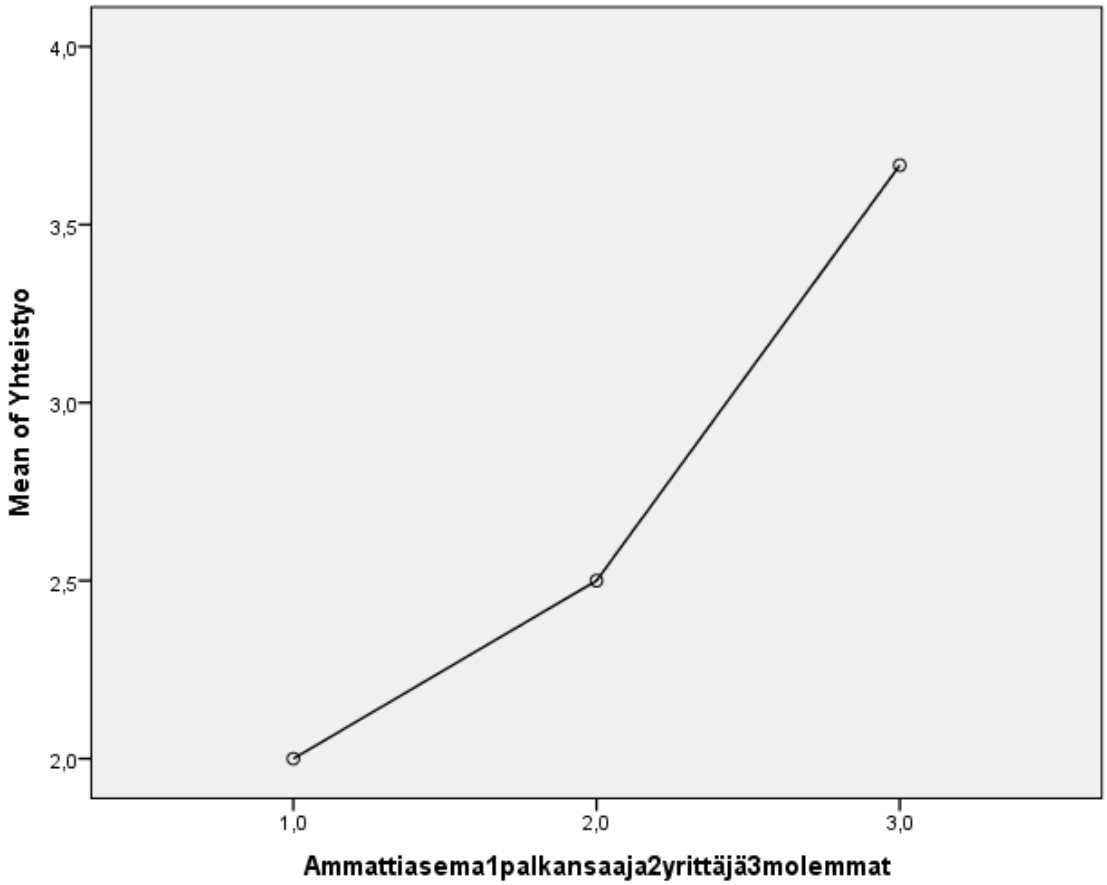


Figure E. Ammattiasema ja Yhteistyö: Palkansaajien ja henkilöiden, jotka ovat sekä palkansaajia että yrittäjiä mielipiteet eroavat merkitsevästi (Bonferroni p=0,24) yhteistyön merkityksen osalta. Pelkän yrittäjän ammatilla toimivat henkilöt eivät eronneet merkitsevästi kahdesta muusta ryhmästä. / Professional status and co-operation: Employees and persons who are both employees and entrepreneurs differ significantly (Bonferroni p = 0.24) regarding the importance of co-operation. Persons working only on the entrepreneur's profession did not differ significantly from the other two groups.

Appendix 7: Tulevaisuusverstaan kutsu / Invitation to the Future Workshop (Original in Finnish)

Otsikko s-posti: Tervetuloa Tulevaisuusverstaaseen ideoimaan kestävää ruokaketjua ja Itämeren tilaa!

Tulevaisuusverstas Itämeri ja ruuantuotantoketju

Aika: Tiistai 29.8.2017 klo 14-17
Paikka: Laurea-ammattikorkeakoulu, Leppävaaran kampus (Espoo, Vanha Maantie 9), luokka 253 (Saapumisohjeet ja parkkipaikat: https://www.laurea.fi/laurea/kampukset/leppavaara)

Tulevaisuusverstaassa on tarkoitus kehitellä ja ideoida ratkaisuehdotuksia tulevaisuuden kestävämmästä ruokaketjusta, erityiskohteenaan Itämeri.
Tulevaisuusverstas on osa Riina Kärjen opinnäytetutkimuksen toista osiota. Ensimmäisessä osassa tutkimusta haastateltiin alan toimijoita ja kerättiin aineistoa avainongelmista ruuantuotannon ja Itämeren suhteessa. Tässä toisessa osassa pohditaan Tulevaisuusverstas toimintana ratkaisuita haastatteluissa löydettyihin ongelmakohtiin.
Tutkimus on osa KEHÄ -hanketta: FuturesLab CoFi Laurea, Tulevaisuuden vesiliiketoiminta – vesi nyt ja tulevaisuudessa (Kehä-hanke EAKR 9/2016-8/2018). Voit tutustua lisää: http://cofiblogi.blogspot.fi/p/Futureslab-cofi-tarjoaa.html

Ohjelma

Klo 14.00	Avaus ja tervetuloa tulevaisuusverstaaseen!
Klo 14.15	Alkupuheenvuoro
Klo 14.30	Haastatteluissa nousseiden avainongelmien ja muiden havaintojen esittely
Klo 15.00	Tulevaisuusverstastyöskentelyä
Klo 16.30	Tulevaisuusverstaan ideoiden purku ja loppuyhteenveto
Klo 17.00	Tilaisuus päättyy

Tervetuloa osallistumaan ja vaikuttamaan yhdessä alan asiantuntijoiden kanssa! Tilaisuudessa pääset verkostoitumaan sekä saat uusinta tietoa aiheen tiimoilta. Osallistumalla pääset mukaan tutkimukseen ja halutessasi saat tulokset tutkimuksesta itsellesi.
Tilaisuus on maksuton. Ilmoittautuminen tämän linkin kautta: _____

Yhteyshenkilö: Riina Kärki, sähköposti ja puhelinnumero

Tulevaisuusverstas on tulevaisuustutkimuksen menetelmä. Käytännössä tulevaisuusverstasmenetelmää käytetään siten, että otetaan jokin teema, jonka kautta pohditaan mahdollisia tulevaisuusvisioita ja käytännön polkuja näiden visioiden toteutumiseksi. Tulevaisuusverstas nimensä mukaisesti korostaa yhteistä tekemistä ja toimintaa, tulevaisuuden pohdintaa ryhmissä, ollen osallistava ja vuorovaikutteinen menetelmä.
Lisätietoa esim: Jungk, R. & Müllert, N. R. (1987): Tulevaisuusverstaat: käsikirja demokratian elvyttämisen mahdollisuuksista. Helsingin yliopiston ylioppilaskunta, Kansan Sivistystyön Liitto ja Ruohonjuuri Oy. Waskipaino, Karkkila.

Appendix 8: Tulevaisuusverstaan palautelomake / Feedback form for the Future Workshop (Original in Finnish)

Palautelomake: Tulevaisuusverstas Itämeri ja ruuantuotantoketju

1. **Olen**
   ☐ Nainen ☐ Mies
2. **Ikäni**
   ☐ Alle 18 vuotta ☐ 18-29 vuotta ☐ 30-39 vuotta
   ☐ 40-49 vuotta ☐ 50-60 vuotta ☐ Yli 60 vuotta

3. **Vastasiko Tulevaisuusverstas odotuksiasi?**

☐ Ei lainkaan	☐ Jonkin verran	☐ Hyvin	☐ Erinomaisesti
			

4. **Mitä kehitettävää tapahtumassa mielestäsi on?**

_____

_____

_____

5. **Arvioi seuraavia tapahtumaa koskevia asioita.**

	1=Täysin eri mieltä	2=Jokseenkin eri mieltä	3=Jokseenkin samaa mieltä	4=Täysin samaa mieltä
Tapahtuman sisältö oli mielenkiintoinen.				
Tapahtuman vetäjät olivat osaavia.				
Sain tapahtumasta uutta tietoa/mielenkiintoista sisältöä.				
Tapahtuman tarkoituksena oli löytää ongelmakohtia aiheella ruoka & Itämeri, niihin ratkaisuja ja tulevaisuuden toimintamalleja. **Tapahtuma vastasi tätä tarkoitusta.**				

6. **Miten koet hyötyneesi Tulevaisuusverstaaseen osallistumisesta?**

_____

_____

7. **Muuta palautetta ja terveisiä järjestäjille.**

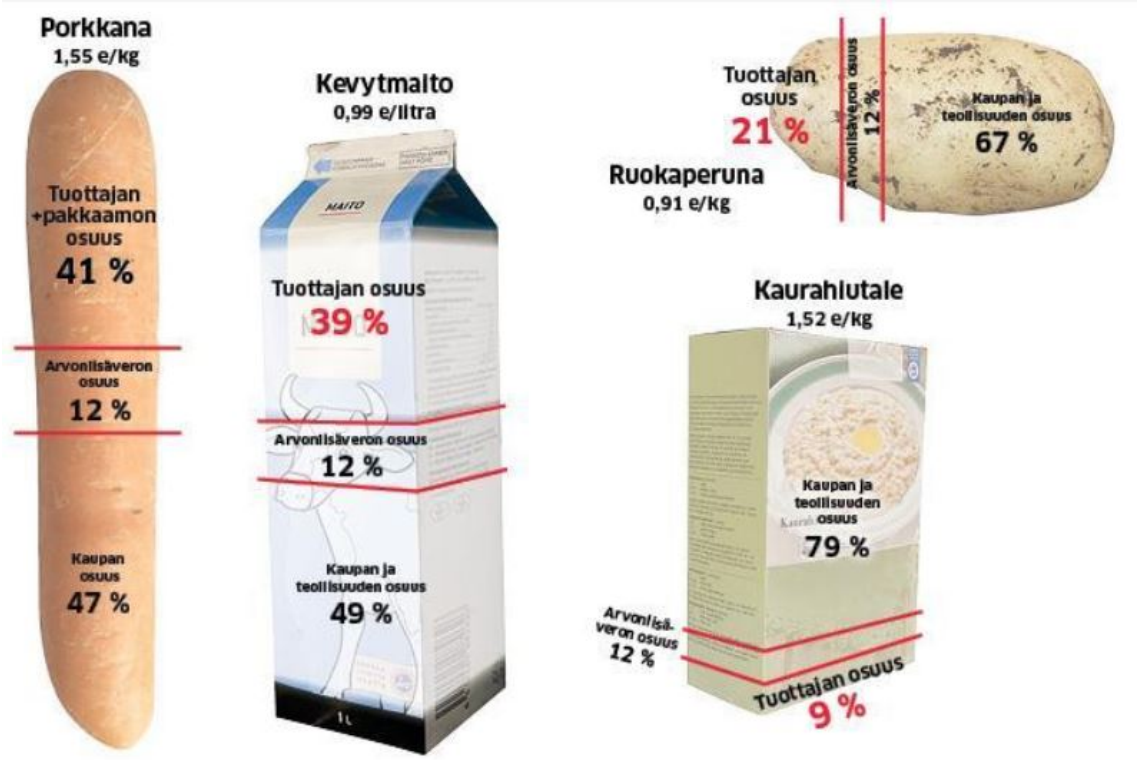
_____

_____

_____

KIITOS PALAUTTEESTA!

Appendix 9: The share of economic output received by the farmer in the final price of the product on MTK's studies/ Tuottajan saaman tuoton osuus tuotteen lopullisesta hinnasta MTK:n tutkimuksista. Maaseudun Tulevaisuuden uutinen 24.9.2017 (Hemmilä 2017).



MTK:n laskelmat keskittyvät peruselintarvikkeisiin. Laskelmat kesän 2017 tietojen mukaan.

Appendix 10: Sustainable food system in Finland (Sitra´s idea of Future steps) / Suomen kestävä ruokajärjestelmä, pohjana kiertotalous (Sitran ajatus tulevaisuuden suunnasta) (Sitra 2016)