

From Farm to Sea

Applying Michelsen's Six Step Theory to organic farming in Lithuania and its role in reducing eutrophication in the Baltic Sea and the Curonian Lagoon

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Abstract

Eutrophication in the Baltic Sea and Curonian Lagoon, mainly caused by agriculture, is creating a major burden on Lithuania. While organic agriculture reduces eutrophication, the conversion of lands under conventional agriculture to organic has been relatively slow.

Based on a systematic literature review, I identified 8 case studies and analysed that overall nitrogen and phosphorous leaching from organic farming was 38% and 22% lower respectively than in the conventional counterparts. I applied Michelsen's Six Step Theory of the institutional development of organic agriculture to 14 interviews with farmers and devising a survey of 134 consumers. I found that the first step has been accomplished, but some of the elements in the remaining five steps have not yet been fulfilled towards the development of organic farming in Lithuania. There is a need for better incentives including collaboration between all relevant stakeholders that would encourage organic farming and reduce eutrophication.

Keywords: institutional development, agriculture, sustainability science, organic farmers, nutrient leaching, consumer awareness

Word count: 11,922

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Abbreviations

BSAP – Baltic Sea Action Plan

CAP – Common Agricultural Policy

EU – European Union

HELCOM – Helsinki Commission

RBD – River Basin District

RDP - Rural Development Programme

TN – Total Nitrogen

TP – Total Phosphorus

1 Introduction

Eutrophication, more commonly known as algal bloom, is an enhancement of nutrients that negatively affects water bodies originating primarily from different anthropogenic activities such as urban wastewater, industry or intensive agriculture (da Costa et al., 2018). In recent times it has become one of the most complicated issues around the world due to the negative impacts on aesthetic, recreational, economic and ecological conditions (Stancinkaite et al., 2011). Eutrophic tendencies increased over the past decades becoming a serious threat. In 1960 eutrophication was detected in 10 water bodies and in 2008 it skyrocketed to 405 water bodies around the world (Selman & Greenhalgh, 2009). The ever-increasing temperatures due to climate change also enhances algal blooms and intensifies eutrophic processes (Jansson et al., 2019). Therefore, it is necessary to curb the nutrient leaching from human activities to avoid even more intense algal blooms in the future.

The Baltic Sea is often referred to as being the most polluted sea around the world (Tynkkynen et al., 2014). 97% of the Baltic Sea is affected by eutrophication which results in a wide spectrum of negative impacts for surrounding countries including loss of biodiversity, negative effects on tourism and human health among others (Fleming-Lehtinen et al., 2018; Wasmund, 2002; Fammler et al., 2018). The nine countries which belong to the Baltic Sea region (Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Germany and Denmark) all contribute to the eutrophic processes as the sea is extremely sensitive to anthropogenic activities (Fleming-Lehtinen et al., 2018). The eutrophication is enhanced due to its geographical characteristics including shallowness, abundant freshwater input from the surrounding countries, and the sluggish exchange of water between the Baltic and the North Sea (Reusch et al., 2018). However, even if the water body has a tendency to natural eutrophic processes, decreasing the additional nutrients from anthropogenic activities would potentially diminish algal bloom levels.

Eutrophication is a complex problem and tackling the issue requires a step-by-step process involving high level expertise, governance, involvement of various institutions and stakeholders, and prioritising detailed research. The countries under the Helsinki Commission (HELCOM) are constantly making efforts to reduce eutrophication while working under the Baltic Sea Action Plan (BSAP). The BSAP has an array of objectives and targets to curb the nutrient levels causing harmful algal blooms (Murray et al., 2019). However, the ambition to reach good ecological status for the Baltic Sea and the Curonian Lagoon (hereinafter referred to as the Baltic Sea) and reduce eutrophication by 2020 was not reached and thus the updated BSAP is expected to be released around mid-2021 (HELCOM, 2020a).

The Baltic Sea is an important part of Lithuanian economy and culture. Around 3% of the total GDP in Lithuania originates from the shipping industries, coastal tourism and fishing (European Commission, 2015). The shallow Curonian Lagoon, which catches all freshwater runoff from Lithuania, is separated from the sea by the Curonian Spit (Fig. 1). This area contains unique and vulnerable biodiversity of marine species and the entire region of Curonian Spit is declared as UNESCO heritage site (Inacio et al., 2018). However, eutrophication is one of the main reasons for the dead zones which negatively affects the coastal areas in Lithuania (Murray et al., 2019), and is expected to worsen under current policies, stressing the biodiversity and socioeconomic wellbeing of the country (Daunys et al., 2020).

The main contributor to the harmful algal blooms in the Baltic Sea is excess nutrients mainly originating from agriculture (Daunys et al., 2020). Approximately 60% of land in Lithuania is designated to agricultural activities (European Commission, 2020a) and in 2019 it accounted for around 3% of the total GDP in Lithuania (Statista, 2021) and provided approximately 6% of total employment (The World Bank, 2020). Agriculture contributes to around 55% of nutrient runoff into the Baltic Sea (Lietuvos Respublikos Vyriausybė, 2017). Nutrients leaching from agriculture are responsible for the failure to reach good ecological status in the River Basin Districts (RBDs) approximately 12% of the Venta RBD, 20% in the Nemunas RBD and a staggering 71% in Lielupe RBD (Plunge, et al., 2018).

Lithuania puts immense efforts in trying to reduce excess nutrients from anthropogenic activities. They invested around 1 billion euros from 2004 until 2020 to urban wastewater treatment systems which helped in reducing the discharge of nutrients from the cities and successfully move towards achieving better ecological status of the Baltic Sea (Leflaive, 2019). Lithuania introduced and levied pollution taxes that help to control the industries (Leflaive, 2019). However, nitrogen and phosphorus leaching from agriculture is harder to control since it heavily depends on precipitation, soil quality and overall agricultural management techniques (Remeikaite-Nikiene & Lauciute, 2020).

One of the proposed ideas to control nutrient leaching from farming is to enhance the organic farming sector (Fammler et al., 2018). Unlike conventional farming, one of the main constituents of organic agriculture is strict management of fertilisers which consequently lessens harmful nitrogen and phosphorus runoffs (Seufert, Ramankutty & Mayerhofer, 2017). Despite early uncertainty about the potential benefit of organic agriculture in reducing eutrophication (Tuomitso et al., 2012), the new BSAP regards nutrient runoffs from agriculture as one of the major contributors to eutrophication and thus emphasises the growth of the organic farming sector as one of the measures to decrease overall nutrient runoffs (HELCOM, 2020b). The differences in characteristics and the economic and environmental benefits of organic agriculture are acknowledged by the consumers and the government of Lithuania thus stressing the need to expand the organic farming sector. However, the

current growth of organic farming, at only around 8% of total agriculture in Lithuania and growing at the slow pace of approximately 0.26% per year (Fig. 8) is considered to be too meagre to make any positive impact on environment. Lithuania does not have a set goal or action plan for the successful development of organic farming. Therefore, it is necessary for Lithuania to increase the growth of organic agriculture.

Considering the large and growing area under conventional agriculture in Lithuania, and comparing it to the relatively minuscule areas of organic farms which is developing slower than expected, it can be argued that eutrophication tendencies in Lithuania will not decrease if no appropriate measures towards the promotion of organic agriculture is taken.

1.1 Research aim

In this thesis, I aim to provide evidence that if carefully managed organic farming practices increased in Lithuania, by transitioning conventional farms into organic agriculture, the eutrophication levels in the Baltic Sea would be likely to reduce over time. However, the development of organic agriculture is considered to be slow due to the lack of institutional development. To go into further analyses in regard to organic farming in Lithuania, I have applied the Six Step Theory proposed by Michelsen et al. (2001) which analyses and suggests improvements regarding institutional development of organic agriculture, based on evidence from six EU countries, including Belgium characterised by *pure competition* interrelationship and Denmark with total agricultural area and landform which are similar to Lithuania. Therefore, the thesis addresses the following research questions (RQs):

RQ1: How does nitrogen and phosphorus leaching from conventional farming compare to leaching from organic farming in the EU?

RQ2: How do farmers in Lithuania perceive the challenges and benefits of conducting organic agriculture?

RQ3: How do consumers in Lithuania promote and hinder the institutional development of organic agriculture?

RQ4: How far has organic farming developed in Lithuania in regard to the Six Step Theory?

The thesis contributes to sustainability science by analysing the Six Step Theory which promotes the development of robust and pertinent institutional environment that would boost the growth of the sustainable organic farming sector and in turn would potentially reduce eutrophication levels in the Baltic Sea.

1.2 Contribution to sustainability science

Sustainability science is a field of research that deals with interrelationships “between nature and society” (Kates et al., 2001, p.641). It emphasises on the complex interactions between multiple disciplines to support sustainable development (Clark & Dickson, 2007).

The thesis addresses two sustainability issues identified by Jerneck et al. (2011): biodiversity loss and land use change. There are three main characteristics of sustainability science: 1) Methodological pluralism (several methods used in one study which would be “aimed at action”), 2) Integrated assessment (using knowledge (science) to work towards action (policies)) and 3) Interdisciplinarity (working towards integration of results into interdisciplinary frameworks, contexts and fields) (Spangenberg, 2011, p. 276).

I attempted to apply all three characteristics in the thesis:

- 1) I used a range of methods involving a collection of both quantitative and qualitative data that is aimed at elaborating on institutional development;
- 2) I assessed the benefits of organic farming, analysed the state of institutional development in the organic farming sector and worked towards devising potential recommendations on the improvement of national policies and institutional environment. This paper contributes to sustainability science as I showcased the benefits of organic farming, analysed and evaluated the institutional development of the organic farming sector in Lithuania as per the Six Step Theory by Michelsen et al. (2001);
- 3) I aimed at interdisciplinarity by involving diverse stakeholders including consumers, organic and conventional farmers and the governing body of Lithuania into the process of the research, evaluating the possible boundaries and considering the possible solutions across different disciplines and sectors.

2 Background

2.1 Coastal areas in Lithuania

This paper focuses on Lithuania and its maritime area which includes the Curonian Lagoon and Lithuanian coastal territories of the Baltic Sea (Fig. 1). The coastline in Lithuania is 262 km long (European Commission, 2015) while the territorial waters of Lithuania are 1,810 km² (MSP-platform, 2020).

The Baltic Sea is one of the largest brackish water bodies in the world where the salinity ranges from 5g/kg to 7g/kg (Kniebusch et al., 2019) and can be almost regarded as a freshwater body since the average global seawater salinity is around 35g/kg (Millero et al., 2008). The sea is mainly fed with fresh

water supplies from rivers flowing through the surrounding countries which also bring pollutants and excess nutrients enhancing eutrophication (Kniebusch et al., 2019). The sea is a semi-enclosed water body which has restricted water exchange with the North Sea at the small outlet at Kattegat Bay between Denmark and Sweden (Fammler et al., 2018). Low salinity levels and slow exchange of water makes the sea extremely sensitive to the surrounding pressures due to accumulation of pollutants from anthropogenic activities thus encouraging eutrophic processes which poses serious threats to the local ecosystem (Smol et al., 2020).

The Curonian Lagoon (Fig. 1) is the biggest semi-enclosed lagoon in Europe characterised as shallow (average depth 3.8 metres), almost freshwater body located in the coastal areas of Lithuania and shared with the region of Kaliningrad, Russia (Meziene et al., 2019; Zemlys et al., 2013). This lagoon is disconnected from the Baltic Sea by the isthmus of Curonian Spit and the only place where it meets the sea leading to water exchange is the small outlet in the Klaipeda Strait (Fig. 1).

The main discharge into the Curonian Lagoon is from the Nemunas River, of which 48% originates from Lithuania, 46% from Belarus while Kaliningrad (Russia), Poland, and Latvia contribute to the rest (Raike et al., 2018). The Nemunas contributes to about 98% of water input (Cerkasova et al., 2016). As the Nemunas River drains the central and western Lithuanian lowlands which are the country's best agricultural lands (FAO, 2016) and consisting of mostly intensive agricultural areas (Raike et al., 2018), the river is highly nutrient polluted (Meziene et al., 2019). Considering the international boundaries with all the RBDs, there is a need for establishing a successful collaboration and dialogue between the neighbouring countries sharing the RBDs in order to ensure cooperation for monitoring programmes and implementing River Basin Management Plans towards nutrient reduction.



Figure 1. Map of Lithuania. The figure shows map of Lithuania as well as the neighbouring countries, River Basin districts (RBDs), Curonian Lagoon, Klaipeda Strait, coastal areas of Lithuania and the River Nemunas. The figure was created by author.

2.2 Current Eutrophication status in Lithuania

The coastal areas of Lithuania is constantly failing to achieve good ecological status (Table 1). The ecological status of water bodies is usually classified according to the five main levels – *very good*, *good*, *average*, *bad* and *very bad* (Remeikaite-Nikiene & Lauciute 2018). The quality of the water body depends on several indicators which includes monitoring the levels of chlorophyll a, levels of total Nitrogen (TN) and total Phosphorus (TP), evaluating the transparency of water, calculating the abundance of macroinvertebrates, measuring the levels of phytoplankton and observing the ichthyofaunal indicator (Remeikaite-Nikiene & Lauciute 2018). The monitored coastal areas in Lithuania are classified as highly eutrophic, ranging from *average* to *bad* or *very bad*, indicating the necessity for future studies and careful management of nutrients.

The coastal areas*	Years	2010	2011	2012	2013	2014	2015	2016	2017	2018
Central Curonian Lagoon		bad	bad	bad	bad	bad	bad	bad	bad	bad
Northern Curonian Lagoon		average	average	average	average	average	average	average	average	average
Klaipeda Strait		average	average	very bad	average	average	very bad	average	average	average
Zone of distribution of Curonian Lagoon waters in the Baltic Sea		very bad	bad	very bad	average	bad	very bad	bad	bad	average
The open rocky shore of the Baltic Sea		average	bad	very bad	bad	bad	bad	average	average	average
The open sandy shore of the Baltic Sea		average	average	average	average	average	average	average	average	average

Table 1. Ecological status of the coastal areas in the Lithuanian Baltic Sea. The table shows the ecological status of the coastal areas in Lithuania from 2010 to 2018. Different colours indicate the ecological status:

very good; good; average; bad; very bad.

* To understand the coastal areas in Lithuania refer to the Appendix A. The data for the table was taken from Remeikaite-Nikiene & Lauciute (2018) and created by author.

During heavy precipitation, the country experiences high levels of nutrient leaching into the RBDs which eventually reaches the Baltic Sea (Feiza et al., 2019). Therefore, the entire territory of the country has been declared as nitrate vulnerable zone (Aplinkos apsaugos agentura, 2020). Annual precipitation is one of the main factors which decide the nutrient runoffs and inputs of TN and TP from farmlands into the rivers (Fig. 2).

In the period 2010-18, precipitation accelerated nutrient leaching from the soil leading to the Nemunas River exceeding the recommended nutrient input ceiling and worsening ecological status of the coastal areas as emphasised by the HELCOM statistical data portal (HELCOM, 2019). The annual levels of TN and TP were higher than the recommended nutrient input ceiling (Fig. 2). It can be seen that the mean TN over this nine year period is more than double the recommended nutrient input ceiling for Nemunas and the highest TN in 2017 due to heavy precipitation that increased leaching from farmlands, was more than triple the limit. Similarly, the mean TP over this nine year period is also more than double the recommended nutrient input ceiling for Nemunas, and more than four times the limit in 2017 (Fig. 2).

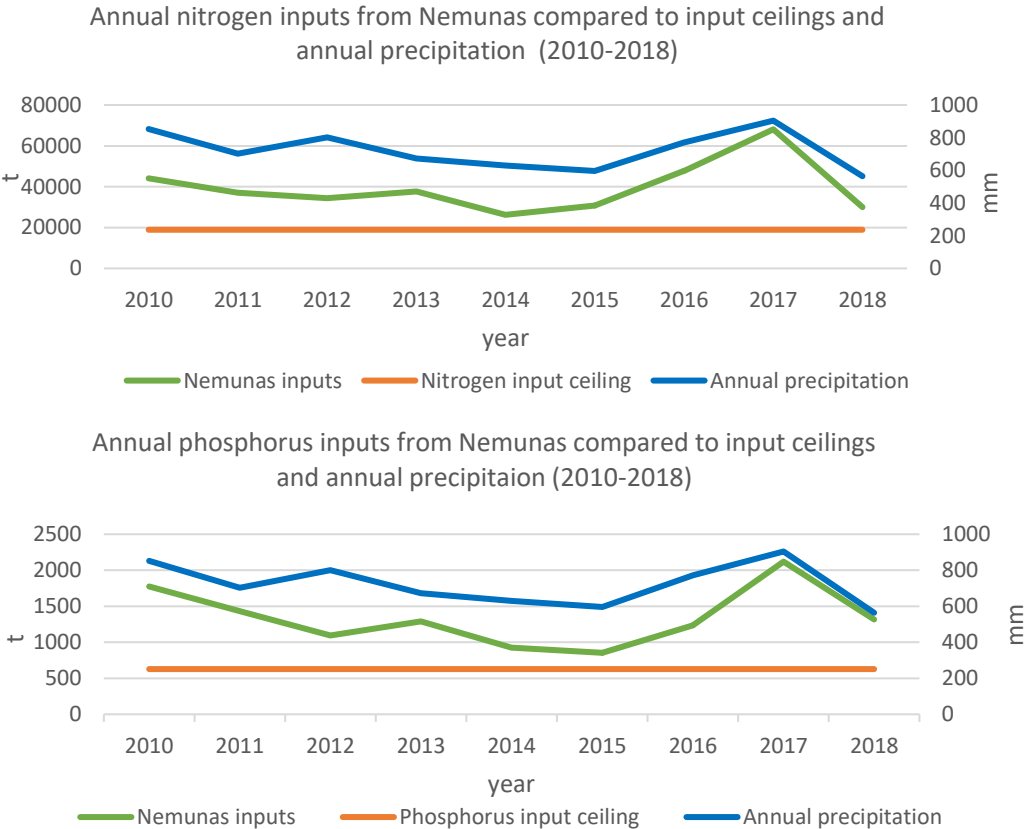


Figure 2. Annual nitrogen and phosphorus inputs measured at the Nemunas and compared to the annual precipitation levels. The nutrient inputs were measured at the Nemunas outlet into the Curonian Lagoon and the Baltic Sea and compared to the annual precipitation levels. The data for nutrient input ceilings was gathered from HELCOM (2021) report. The data for nutrient inputs from Nemunas was gathered from HELCOM (2019) database (Appendix G). The data for annual precipitation was provided by the Lithuanian Hydrometeorological Service (Appendix F). The figure was created by the author.

3 The Six Step Theory

The Six Step Theory was first introduced by Johannes Michelsen, Kennet Lynggaard, Susanne Padel and Carolyn Foster in 2001 (Michelsen et al., 2001). The theory analyses the development and current state of organic farming within the EU countries, using institutional aspects and institutional theory, and proposes efficient policies and institutional improvements in regard to the growth of organic farming sector in six steps (Table 2). The theory was developed by studying cases of institutional development in six EU countries: Austria, Belgium, Denmark, Greece, Italy and United Kingdom.

The Six Step Theory consists of three domains which are interconnected with one another in complex relationships and also responsible for creating barriers in regard to organic farming (Michelsen et al., 2001). The three domains are: (1) the farming community, (2) agriculture policy and (3) food market. All three of them must collaborate and work with one another within institutional environments in all six steps to successfully develop organic farming sector (Michelsen et al., 2001, p i). The three domains and the corresponding institutions are represented within all six steps, namely: **1)** establishment of the organic farming community, **2)** establishment of political recognition, **3)** introduction of financial support, **4)** development of non-competitive relationships, **5)** development of organic food market and **6)** establishment of attentive and committed institutional setting (Michelsen et al., 2001, p. vii).

The first three steps are crucial in order to have a strong establishment of the organic sector and the last three steps are regarded as being essential for the stable progress of organic agriculture (Larsson et al., 2013). The Six Step Theory should not be adopted in a linear manner but rather used in a circular path (Michelsen et al., 2001). Therefore, when countries fulfil all the steps it is essential to go back to the beginning and assess the existing institutions in order to devise better strategies and look into the possible barriers (Michelsen et al., 2001).

The EU Member States carry out the specified rules for agriculture differently from each other to be able to adapt to their national regulations (Michelsen et al., 2001). As a result, certain procedures such as financial support, market development or institutional setting in regard to the development of the organic farming sector differ in almost every EU country. Therefore, in many cases weak institutional setting interferes with the progress of the already sluggish growth of organic agriculture (Larsson et al., 2013). The Six Step Theory identifies the possible barriers within the institutional setting that hinders the development of organic farming and finds possible solutions (Larsson et al., 2013). Therefore, the Six Step Theory was chosen in to order to understand how Lithuanian state institutions developed their governance and policies to support the growth of the organic farming sector.

Steps	Characteristics of a successfully established step	Indicators of characteristics
Step 1: Establishment of the organic farming community	1.1 Robust identity of organic farming community	1.1.1 The introduction of organic farming as a concept (date)
	1.2 Established organic farming associations	1.2.1 Associations for organic farmers exist 1.2.2 Farmers who are a part of the associations
Step 2: Establishment of political recognition	2.1 Regulations and governance in regard to organic farming exist	2.1.1 Introduction of the first national regulation regarding organic farming (date) 2.1.2 Current regulations regarding organic farming (date)
	2.2 Procedures and strategies	2.2.1 Organic farming strategy is a part of general farming strategy in the country 2.2.2 Target to reach for organic farming in the country (%)
Step 3: Introduction of financial support	3.1 Financial support	3.1.1 Financial support is introduced (date)
	3.2 Area payments	3.2.1 Area payments exist 3.2.2 The amount provided for organic farming only (euro/ha)
	3.3 Research and innovation programme support	3.3.1 Research support designated for organic farming exists (euro/year) 3.3.2 Range of research programme
	3.4 Financial schemes and subsidies	3.4.1 Loans for organic farms exist 3.4.2 Tax reduction for organic farms exists 3.4.3 Certification/inspection cost reimbursement
Step 4: Development of non-competitive interrelationships	4.1 Cooperation (<i>pure co-operation, pure competition and creative conflict</i>)	4.1.1 Cooperation and dialogue between the farming community, agriculture policy, and the market exist
	4.2 Inclusion of organic farming into official state institutions	4.2.1 Political body designated to represent organic farming community exists
Step 5: Development of organic food market	5.1 Established supply chain for organic farming sector	5.1.1 Designated areas to process organic products exist 5.1.2 The entire supply chain for organic production is established 5.1.3 Promotion of the organic products
	5.2 Consumers choice and favour of organic production	5.2.1 Consumers understand the concept of organic farming 5.2.2 Consumers understand the value of certified product with the official logo 5.2.3 Consumer acceptance of organic products (%) 5.2.4 % of consumers who buy organic products more than once a

		week/ more than once a month/ lesser than once a month 5.2.5 Price acceptance (%)
	5.3 Certification for organic products	5.3.1 Special organic product logo is used
	5.4 Market share of organic products is large	5.4.1 Market share of organic products (total percent)
Step 6: Establishment of attentive and committed institutional setting	6.1 Inclusive space for dialogue regarding both parties and future action planning	6.1.1 Discussion arena is created 6.1.2 Future action plan for organic farming is set and/or constantly discussed

Table 2. *The Six Step Theory by Michelsen et al. (2001). The table shows the in-depth analysis of the steps by showing the characteristics of the steps and the relevant indicators for the characteristics. The table was created by the author based on the theory of Michelsen et al. (2001) and inputs of Larsson et al. (2013, p.6, 7) who closely worked on the theory by establishing the essential indicators. The original table from Larsson et al. (2013, p. 6, 7) can be found in Appendix D).*

3.1 The Six Steps in detail

Step 1: Establishment of an organic farming community

Establishing a successful organic farming community is the initial step towards the development of organic farming. The identity of organic agriculture is usually regarded as a “social movement” (Michelsen, 2009, p. 254) as organic farmers are willing to establish or switch to organic practices due to their personal beliefs and ideas in regard to changing different aspects of the mainstream agricultural activities. However, the problem arises when farmers have biases or very little knowledge in regard to organic farming which often results in relatively small numbers of farmers transitioning to organic practices (Siepmann & Nicholas, 2018). Therefore, it is essential to establish a community and associations that would provide guidelines, sufficient knowledge and support in transitioning towards organic farming.

Step 2: Establishment of political recognition

Country-level governmental recognition of organic farming strengthens the establishment of the sector (Michelsen et al., 2001). It consists of specific regulations and measures including environmental and quality monitoring programmes as well as establishing procedures and future strategies. Political recognition is followed by more tangible governmental support such as financial aid (Larsson et al., 2013).

Step 3: Introduction of financial support

Financial support for both organic and conventional farming communities within member states are usually paid from the Common Agricultural Policy (CAP) funds that come from the general budget of the EU (European Commission, n.d.). This is usually introduced with the additional payments to the farmers depending on the type of farming and the so called ‘greening’ payments from the Pillar II of CAP, which is focused on environmental and rural development issues. Research support along with

different schemes, projects, loans and subsidies help in assisting the organic farming sector towards further growth (Michelsen et al., 2001).

Step 4: Development of non-competitive interrelationships

Non-competitive interrelationships are created between the three domains of farmers, policy, and markets, which together represent the institutions related to the organic farming sector and need to actively collaborate with each other for further development of organic farming (Michelsen et al., 2001). The successfully implemented relationship dynamics, dialogue and cooperation between the three domains usually motivate and encourage other farmers to establish or transition to organic agriculture thus advancing the overall development of the sector (Michelsen et al., 2001). Michelsen et al. (2001) describe three main relationships between the three domains, namely: *pure co-operation*, *pure competition* and *creative conflict* (Table 3). The latter is the best because it is a combination of both collaboration and conflict which leads to constant exchange of views for betterment of situations and results in the continuous development of the organic farming sector.

Components	Type of relationship between the three domains		
	Pure co-operation	Pure competition	Creative conflict
General relationship between organic and general agriculture institutions	Unconditional co-operation in regard to every aspect	Very little or no co-operation between the three domains	A combination of both collaboration and conflict in regard to various aspects
Need for organisations related to organic farming	No	Yes	Yes
Perception of interests	No wish for clear communication and the so-called “silence on differences in farming systems” is apparent	Elimination of all possible dialogue between the three domains	Collaboration in regard to pursuing and addressing some issues and conflict in regard to others
Exchange of views	No wish for exchange of views	No effort is made for exchange of views	Mutual respect and constant exchange of views for betterment of situations
Possible results in regard to the identity of organic farming	Shrinking sense of identity	Weak identity and stagnation	Continuous development
Possible results in regard to the development of organic farming	Gradual crippling of further development	Restricted growth and development	Gradual development

Table 3. Type relationship between the three domains. The three main relationships between the organic farming sector and the agricultural institutions. The table shows and analyses the three possible relationships between the organic farming sector and agricultural institutions as per Michelsen et al. (2001). The table is taken from Michelsen et al. (2001, p.11) and adapted by the author for relevance in regard to the case study. The original table can be found in Appendix E.

Pure co-operation

Pure co-operation is based on unconditional cooperation between the organic farming sector (the farming community) and the other institutions that belong to the remaining two domains (agricultural policy and the food market). There is no need for support organisations and there may be no distinction between organic and conventional farming as there is “silence on differences in farming systems” (Michelsen et al., 2001, p.10). When the *pure co-operation* exists between the three domains, there

are no clashes of interest and no propositions for further development. Such interrelationship diminishes organic farming identity. This particular interrelationship can only be successful if the objective of the government is to establish organic agriculture across the entire country (Michelsen et al., 2001).

Pure competition

Unlike *pure cooperation*, the *pure competition* interrelationship results in very little or no communication between the existing farming institutions among the three domains as they see one another as a competitor within the market and in regard to governmental and economic support (Michelsen et al., 2001). Although there is a strong need for support organisations and further action that would strengthen organic agriculture, there is no cooperation, no exchange of proposals and pre-existing continuous clashes of interests between the three domains. Consequently, the *pure competition* interrelationship restricts the growth and strengthening of organic agriculture sector and its identity in the country (Larsson et al., 2013).

Creative conflict

Creative conflict is considered the best interrelationship between the three domains (Michelsen et al., 2001). There is successful dialogue between the organic farming sector and the existing farming institutions as they cooperate on some aspects and compete on the others (Michelsen et al., 2001). It is considered that creative conflict creates a continuous collaboration in regard to solutions between the three domains which are solved either by the cooperation or competition. Thus it is considered that creative conflict would eventually bring about the change which would benefit both parties and encourage the successful development of organic agriculture (Michelsen et al., 2001).

Step 5: Development of organic food market

It is advantageous to possess a robust national market consisting of a successful supply chain management and network including suppliers, manufacturers, distributors and retailers in the organic sector (Larsson et al., 2013). Additionally, there is a need for certification of organic production and a customer base who would frequently buy organic products (Larsson et al., 2013).

Step 6: Establishment of attentive and committed institutional setting

The final step consists of the collaboration of three domains involving active participation of relevant institutions in the organic sector to define the future goals and reduce potential barriers in regard to the development of organic farming (Michelsen et al., 2001).

4 Materials and methods

Systematic literature reviews were conducted to compare nitrogen and phosphorous leaching between organic and conventional farming in the European Union (RQ1). Semi-structured qualitative interviews with 14 farmers of Lithuania were conducted to understand the challenges and benefits of starting organic farming (RQ2). 134 consumers were surveyed to identify the possible barriers in the development of organic farming (RQ3). In order to assess the Six Step Theory by Michelsen et al. (2001) (RQ4) the data collected from interviews and surveys along with statistical data, grey literature and different academic articles were analysed.

4.1 Data collection and analysis

4.1.1 Systematic literature review for nutrient leaching in organic and conventional farms

To assess if organic agricultural practices have lower nutrient (TN + TP) leaching than conventional agriculture (RQ1), I conducted a literature review comparing organic and conventional farms around EU countries (RQ1).

The literature review was conducted in 4 stages: 1) setting the criteria for relevant articles, 2) searching for academic literature, 3) assessing the relevance of the study to the thesis, and 4) analysing the data.

To find relevant articles, the following criteria were set: a) an article must be comparing both organic and conventional farming; b) it must be an academic, peer-reviewed article; c) the study must be conducted within the EU; d) the article must be published within the period 2000-2021. I gathered articles from databases such as Web of Science and Google Scholar while using relevant keywords (Table 4). Articles were searched in both English and Lithuanian.

During stage 1 & 2, I selected eight articles for further in-depth analysis. The analysis was conducted by gathering information on nutrient leaching in organic and conventional agriculture along with other variables that could affect nutrient levels such as country, type of crop, soil, fertiliser, levels of precipitation and depth of the soil the samples were taken from.

RQ	Database platform	Keyword series
RQ1	Web of Science	"Nutrient" AND "Leaching" AND "Organic" AND "Conventional"
		"Organic farming" AND "Conventional farming" AND "Nutrient"
		"Agriculture" AND "Nutrients" AND "Lithuania"
	Google Scholar	Organic farming VS conventional farming nutrient leaching
Organic farming conventional farming nitrogen phosphorus leaching		
RQ2	Not applicable	Not applicable
RQ3	Not applicable	Not applicable

RQ4	Web of Science	“Organic farming” AND “Lithuania”
	Google Scholar	Institutional development organic farming Lithuania
		Institutional barriers organic farming Lithuania

Table 4. Keywords used for literature review (in English). The table aims to present the database platforms used to search for articles and keywords that were used in order to get most of the results in order to answer RQs. Additionally, the Appendix H shows the keywords that were used in Lithuanian language.

4.1.2 Semi-structured qualitative interviews with organic and conventional farmers

Semi-structured qualitative interviews were chosen as a method to have an effective conversation with the interviewees. Semi-structured interviews offer a flexibility to ask additional questions and change the order of questions to reach the goal of the study (Bryman, 2012).

The interviews with both organic and conventional farmers were conducted to answer RQ2 and RQ4. It was used to find out the benefits of organic farming and the main barriers hindering the establishment or transition towards organic agriculture (RQ2) while elucidating the impressions towards governance and share opinions on overall institutional development in regard to agriculture in Lithuania to be able to corroborate each step of the Six Step Theory by Michelsen et al. (2001) (Fig. 3) (RQ4).

The criteria for the interviewees were that the farmers were receiving area payments from the CAP and they had to be certified (organic farmers only). The interviews followed the interview guide and consisted of the 3 stages:

- 1) A general message was shared inviting farmers to a research interview about their experiences in regard to the agricultural activities, policies, institutional development and their relationship with the agricultural policy and market domains in Lithuania. The message was shared on different farmer groups on social media and sent out in emails found on farming business websites (N=22 responses).
- 2) A short online survey was sent to everyone who responded to the general message. The purpose of the survey was to group the respondents into organic and conventional farmers plus collect data such as size and type of farm, type of funding, contact details and preferred platform and date for the interview. The second stage also included all participants agreeing to a consent form (N=17 responses).
- 3) Individual interviews. The interviews consisted of separate questions for organic or conventional farmers (Fig. 3). Each interview lasted around 30-60 minutes, with a total of 7 conventional and 7 organic farmers (N=14).

Considering the current COVID-19 pandemic, the interviews were conducted online in order to ensure the safety of both parties.

The interviews were conducted in Lithuanian, recorded and later transcribed using Office Word Online tool. The transcribed interviews were analysed in regard to the Six Step Theory by Michelsen et al. (2001) (Appendix B).

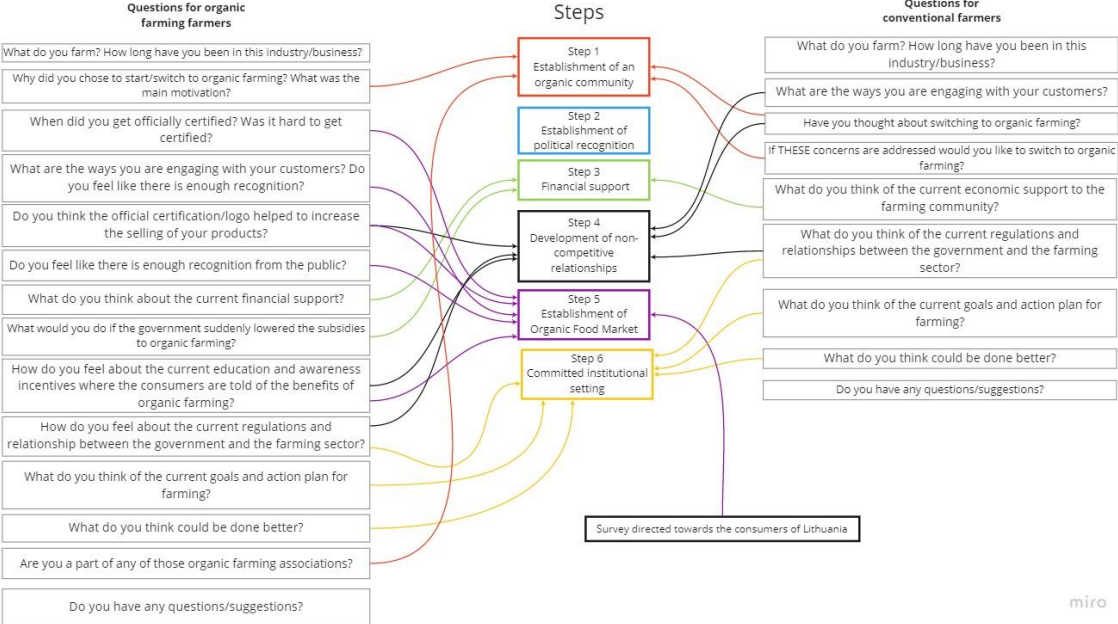


Figure 3. Interview questions addressing the Six Step Theory. Created by the author.

4.1.3 Consumer survey

I conducted a consumer survey (Appendix C) because a strong consumer base is regarded as one of the main factors which motivates the farmers to start organic farming. However, consumers can also become a barrier for organic farming if the organic produce is not prioritised by them or if there is a lack of understanding in regard to the difference between organic and other produce. Therefore, I conducted a survey in Lithuania to reach a wide audience, irrespective of age, gender, education and economic status. 134 individuals responded to the survey.

The consumer survey was created in order to gather data on the general understanding of consumers in regard to organic products and organic farming in Lithuania. The responses were analysed to answer RQ3 in order to understand the possible hindrances originating from the consumers as one of the major barriers for the development of organic farming. The survey also helped in elucidating the level of fulfilment of Step 5 (Development of organic food market) of the Six Step Theory (RQ4).

The survey process consisted of 2 stages:

- 1) General message shared on different groups on Facebook which mainly focused on diets, food and farmer or fresh markets. The message briefly informed the individuals about the purpose of the survey.

2) The survey. The survey was created via *Google Forms*, consisted of 26 questions and was completely anonymised.

4.1.4 Systematic literature review, interviews and survey for Six Step Theory

To answer RQ4 I conducted a systematic literature review directed towards institutional setting in Lithuania to identify the possible barriers for the development of organic farming and propose solutions. I adhered to the Six Step Theory coined by Michelsen et al. (2001) and analysed by Larsson et al. (2013) and Moshitz et al. (2004). The data for the RQ4 was gathered using 3 methods: 1) systematic literature review involving academic and grey literature; 2) interviews with organic and conventional farmers; 3) consumer survey.

In order to find relevant literature the following criteria were set: a) the paper must be about Lithuania; b) the paper should describe at least one institutional setting adhering to the Six Step Theory c) the paper must be published within the period 2000-2021.

The literature review was conducted in 4 stages: 1) setting the criteria for relevant articles, 2) searching for academic and grey literature, 3) assessing the relevance of the study to the thesis, and 4) analysing the data adhering to the Six Step Theory. I selected 19 articles for further in-depth analysis.

The relevant articles were gathered from various databases such as Web of Science and Google Scholar while using appropriate keywords (Table 4). National reports and EU documents were gathered from various databases like *Aplinkos apsaugos agentūra* (EPA of Lithuania), *Lietuvos Respublikos Vyriausybė* (the Government of Republic of Lithuania), *Žemės ūkio Ministerija* (Ministry of Agriculture) and European Commission.

To understand the growth of organic and conventional farming in Lithuania and to determine if the development of organic farming two institutions were contacted: 1) *Žemės ūkio informacijos ir kaimo verslo centras* (Agricultural Information and Rural Business Centre) who provided the data for conventional farming and 2) public institution Ekoagros who provided the data regarding the development of organic farming.

To examine each step of the Six Step Theory I looked into every indicator of its characteristics (Table 2, Section 3). To determine if the step is fulfilled, partially fulfilled or unfulfilled, I looked into the level of completion of Indicators as suggested by Larsson et al. (2013). I categorised them as: 1) Fulfilled, if all indicators within the step were complete; 2) Partially Fulfilled, if the majority of indicators in the step were either complete or partially complete; 3) Unfulfilled, if the majority of the indicators within the step were incomplete.

6 Results

I compared nutrient leaching from organic and conventional farming in the EU countries (RQ1), followed by the reports of the interviews with Lithuanian farmers showing the challenges and benefits of organic agriculture (RQ2) and results from the consumer survey showcasing the barriers for organic agriculture (RQ3). I presented the data on growth of organic and conventional farming in relation to the Six Step Theory to elucidate institutional development in regard to organic farming in Lithuania (RQ4).

5.1 Soil condition and nutrient leaching: comparing organic and conventional farming

From the eight studies comparing organic and conventional agriculture, organic farming had lower annual leaching of both total nitrogen (TN) and total phosphorus (TP) than their conventional counterparts in most cases (Fig. 4 & 5). In total, I found 6 case studies with 18 paired comparisons of TN between the different farms, with all but one (17 out of 18, or 94%) showing lower leaching from organic by a cumulative average of 38%; and 3 case studies with 8 paired comparisons of TP, with 5 (63%) showing lower leaching from organic by a cumulative average of 22%.

The largest differences between organic and conventional farming in nitrogen leaching were detected in the sandy soils (Fig. 4). Organic pig farm & organic dairy and beef farm, both with sandy soil had 45% and 37% lower annual nitrogen leaching levels than the conventional counterparts respectively. Additionally, organic arable crop land with sandy soil had 60% lower nitrogen leaching. It is known that sandy soils are one of the worst regarding nutrient or water retention but organic farms tend to have better nutrient retention abilities even in sandy soils (Hansen et al., 2000). However, an organic dairy farm with sandy soil demonstrated that TN leaching was 25% higher (Fig. 4) but this particular conflicting finding was mainly due to overfertilisation and incorrect crop rotation practices (Kelm, Loges & Taube, 2008).

Phosphorus leaching tends to be lower in organic farms (Fig. 5) as most of the leaching happens from the top layer unlike in conventional farms where the leaching occurs across all the soil layers. Organic wheat and carrot farm had 96% lower phosphorus leaching compared to the conventional farm (Fig. 5). The sample was taken from the lowest soil layer (around 60-80cm) under excessive precipitation. However, the study indicated that the samples taken from the top soil layer (around 0-20cm) in organic wheat and carrot farm indicated that the leaching was 56% higher than the same layer in conventional farms (Fig. 5). The study demonstrated that organic farming may leach more from the top soil layer during heavy precipitation but the lower soil layers are better at retaining nutrients in organic farming than in conventional farming due to better soil quality (Riddle et al., 2018).

Annual TN leaching from organic and conventional farms

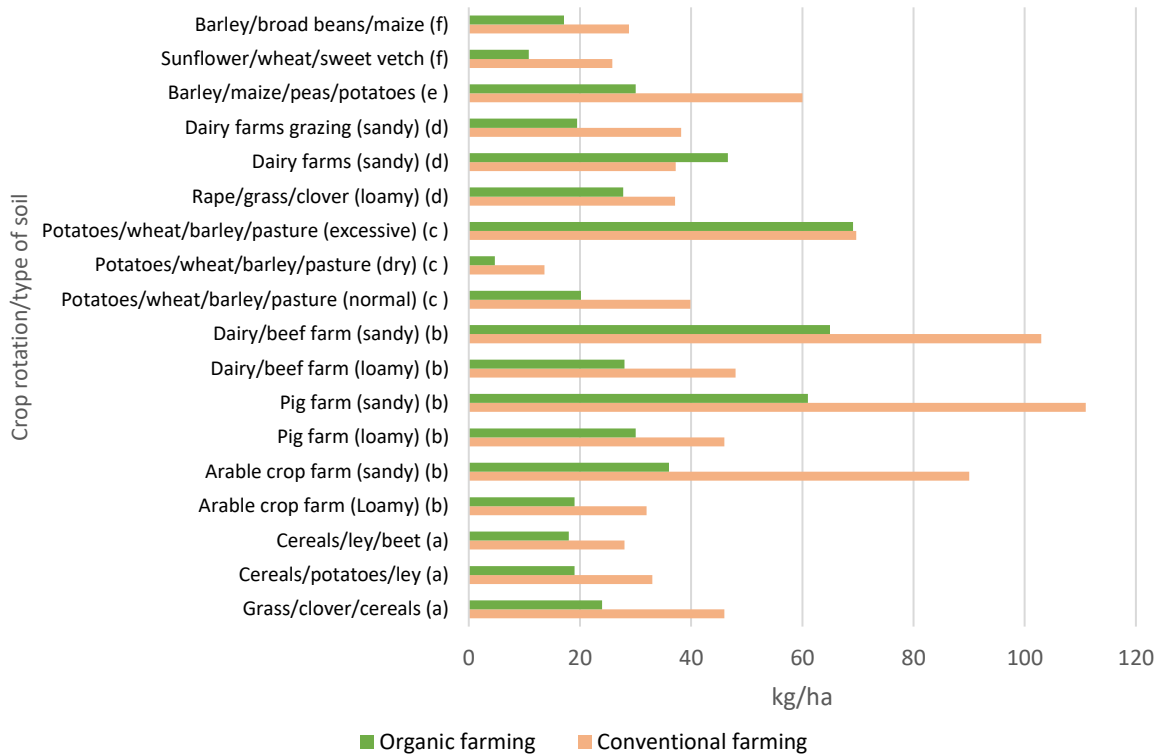


Figure 4. Total nitrogen leaching in different conventional and organic farms around Europe. The figure portrays nitrogen leaching from different types of farms with different crops, soil types and precipitation levels. Full data and information can be found in Appendix J. The figure was created using the data from the following references: **a)** Kirchmann & Bergström (2001); **b)** Hansen et al. (2000); **c)** Buciene (2008); **d)** Kelm, Loges & Taube (2008); **e)** Schramaa et al. (2018) **f)** Pacini et al. (2003). The figure was created by the author.

Annual TP leaching from organic and conventional farms

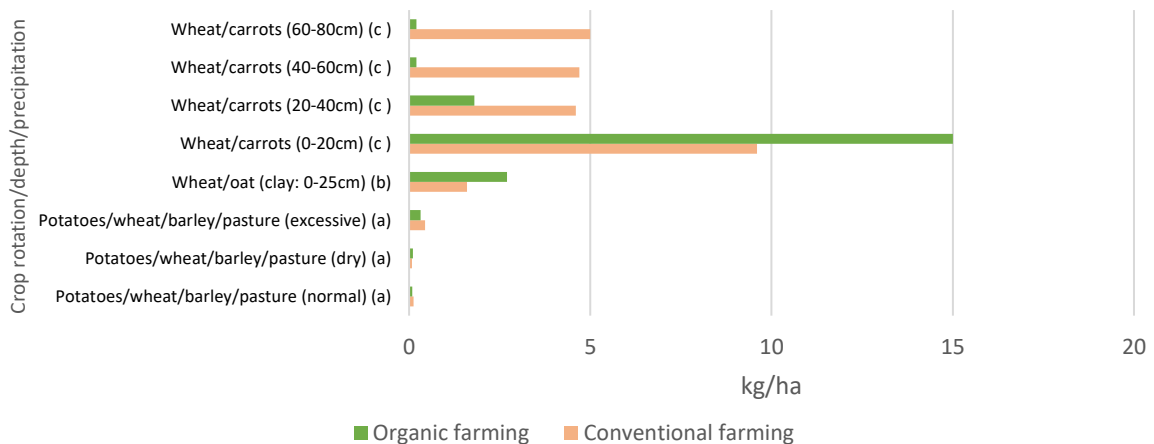


Figure 5. Total phosphorus leaching in different conventional and organic farms around Europe. The figure portrays nitrogen leaching from different types of farms with different crops, soil types and precipitation levels. Full data and information can be found in Appendix J. The figure was created using the data from the following references: **a)** Buciene (2008); **b)** Stenberg et al. (2012) **c)** Riddle et al. (2018). The figure was created by the author.

5.2 Interviews with Lithuanian farmers – motivations and barriers in organic farming

The farmers reported that their motivation to initiate or switch to officially certified organic farming was usually based on personal values, and frequently mentioned that they saw themselves as part of a social movement swaying away from mainstream agriculture. 4 out of 7 interviewed organic farmers (Table 5) indicated that they chose to farm organically because of their personal values, environmental benefits and they would like to produce healthier products by not using any synthetic chemicals. Another reason was family members who had previously taken up organic farming. The remaining 3 respondents indicated that they established organic farms due to better initial financial support.

Farmer	Quotes from interviews showing motivation to start organic farming
Organic farmer_1	<i>I started from conventional farming in 2005 but then became organic in 2015.</i>
Organic farmer_2	<i>My grandmother started from the very first days, as soon as organic farming became a concept in Lithuania. And then started doing it according to the EU standard which was no different from the way we did everything before. Organic farming for me is innate, that's how I got "organic".</i>
Organic farmer_3	<i>I am doing this for a long time. And one thing that motivated me was the cost-effectiveness. And another thing that it is a higher quality product and I also thought that there will be more opportunities in one area or another to develop and expand.</i>
Organic farmer_4	<i>I don't really like chemicals. I always knew I was going to college and then going back to the village and I didn't really know what I will do. But I wanted to live in a village, where the air is healthy, where my children could play.</i>
Organic farmer_5	<i>I guess like everyone else. We jumped into that train and we just went from there.</i>
Organic farmer_6	<i>I came just for nature because I really wanted to live ecologically clean.</i>
Organic farmer_7	<i>My parents were the ones who started so I simply go after them.</i>

Table 5. Motivations to start organic farming as indicated by farmers. Full analysis of the interviews can be found in Appendix B. The table was created by the author.

During my interviews with conventional farmers, I found a clear reluctance towards organic agriculture as all of them revealed that they do not consider shifting towards organic farming because conventional farming had better economic benefits.

Conventional farmers emphasised: a) need for better financial support from the government, b) lack of overall support and dialogue between the three domains which causes instability in the regulatory system leading to lack of future strategies and c) insufficient consumer demand (Table 6).

Reasons	Farmer	Quotes from interviews showing reluctance in switching to organic farming
a) Lack of financial support	Conventional farmer_1	<i>We have a couple of farms nearby that are organic. They have weeds growing there and then they have extra cost to spend in the fields fighting the weeds and then we are affected. So I don't know...</i>
	Conventional farmer_4	<i>I don't think about it. Because it does not pay much in terms of cost of production. There are organic farms around here, but when I talk to them. Well, we live better.</i>
	Conventional farmer_6	<i>It doesn't pay off. For me, it is much cheaper to spray chemicals and cultivate more per hectare while doing conventional farming than organic.</i>

b) Lack of support and dialogue between the organic farming community and the two other domains	Conventional farmer_3	<i>We were officially certified before but it just requires too much of your time and it is not like we sold more if we were certified. Too much paperwork. One for accounting, one for veterinary. Way too many reports.</i>
	Conventional farmer_7	<i>One [reason not to switch] is profitability. In general, income from organic farms is lower. Then you need to look for customers who could buy. Second, maybe the fact that there is too little education and promotion, too little interest. At the moment I do not think about it.</i>
c) Insufficient demand from the consumers	Conventional farmer_2	<i>I don't feel the need to do it. Because as far as I notice the market is very small and narrow.</i>
	Conventional farmer_5	<i>That organic product fashion is more of a city</i>

Table 6. Reluctance to switch to organic farming as indicated by conventional farmers. Full analysis of the interviews can be found in Appendix B. The table was created by the author.

5.2.1 Financial support

The farmers identify financial support as one of the main motivations behind transitioning to organic farming. More than half the interviewed organic farmers mentioned that the additional payment which is provided for organic farmers only, are one of their main reasons behind continuing organic farming. Moreover, 9 out of 14 farmers highlighted their concern about low financial support and future uncertainty as the area payments are getting lower every year (Table 7).

Farmer	Quotes from interviews showing the issues with the financial support and payments
Organic farmer_1	<i>Well, it's [the financial support] there. I cannot say otherwise. Also the additional bonus payment. If you compare it with the usual payments you can feel the difference, of course. <...> If you don't have a lot of area then it probably seems like the payment isn't a lot. Big farms should probably say that it is enough and such farms should not complain.</i>
Organic farmer_3	<i>It [financial support] was much better before.</i>
Organic farmer_4	<i>It [additional area payments] is very much needed. It is available and we should already recalculate how much we use it. And the financial support for organic... Well... it's basically nothing.</i>
Organic farmer_5	<i>It is all such a big bureaucracy. Until we start declaring the land, we don't know exactly how much we will get.</i>
Organic farmer_7	<i>If not for additional payments I guess we would just decrease the production and grow what is cost-efficient... Maybe even stop the organic production.</i>
Conventional farmer_3	<i>Statistically, there are very few large farms, but they are very large and they gather all that funding. <...> We have only 9 hectares so I don't remember exactly how much we get but it is about 3000 euros. It's not even really enough to buy animal feed.</i>
Conventional farmer_4	<i>There is no way to earn as much as you would like, let's just say it like that.</i>
Conventional farmer_5	<i>The payments are declining every year.</i>
Conventional farmer_6	<i>I am not complaining. But I am not sure what the future holds.</i>

Table 7. Financial support as indicated by farmers. Full analysis of the interviews can be found in Appendix B. The table was created by the author.

Better financial support directed towards organic farming would potentially expand the entire sector. Although Lithuania financially supports organic agriculture, the farmers indicated that there is lack of

funds for the new organic farms (Table 8). They mentioned that new organic farmers are able to register their farms as organic with Ekoagros agency, but they were still receiving only the conventional CAP payments, due to the lack of funds for additional payments towards organic farming. Both organic and conventional farmers reported that lack of additional payments is a major barrier for the development of the organic farming sector.

Farmer	Quotes from interviews showing the lack of financial support for the new organic farmers
Organic farmer_1	<i>2015 was the turning point, when those payments encouraged many farms to transition and become certified <...> and there was not enough money <...>. So the government panicked and made a decision that from 2015 those who start [organic farming] will not receive direct payments.</i>
Organic farmer_3	<i>Lithuania, has greatly reduced all ecological payments. Very little is actually left.</i>
Organic farmer_7	<i>The development [of organic farming sector] was completely halted by the recent rural development programme because they simply did not take in new organic farms. They simply did not pay additional payments to the newcomers who wanted to register their organic farm after 2015. So I think this is one of the reason why the development stopped – lack of financial support.</i>
Conventional farmer_2	<i>In fact, I never cared enough to check regulations for organic farms. I know that there is a lack of financial support for area payments. And what about conventional payments? I don't complain about it.</i>
Conventional farmer_5	<i>EU once supported organic farms. Now organic farms, I think, are declining in Lithuania because those additional area payments have fallen very sharply.</i>
Conventional farmer_6	<i>There was some kind of thing that they [the government] didn't allow farms to switch to organic. This is very discouraging [to switch].</i>

Table 8. Lack of financial support for the new organic farms as indicated by farmers. Full analysis of the interviews can be found in Appendix B. The table was created by the author.

5.2.2 Lack of dialogue between the domains and unstable regulatory system

All farmers indicated that the dialogue between the three domains (1) the farming community, 2) agriculture policy and 3) the food market is often limited or non-existent. They expressed their concern that the regulations are made without considering the sizes and types of farms thus resulting in weak identity of organic farms and overall stagnation in further development of the sector.

Fast-changing rules and lack of successful interrelationship between the three domains result in instability in the regulatory system. The farmers indicated that the rules change quite frequently and there is a lack of clear future action plans. They also suggested that the instability in the regulatory system was a major issue that discouraged them from switching to organic farming and they emphasised the need for clearer action plans in general farming strategy (Table 9):

Farmer	Quotes from interviews showing a lack of dialogue and instability within regulatory system
Organic farmer_1	<i>Our government in Lithuania, in general, is “trying to catch up” or to adapt to something. That example with the increase in the number of organic farms: rules were created to encourage the growth [of organic farming]. Then it started growing, then the government realized that the situation is distorted, then started running after farmers, forbidding the growth like “don't do it anymore.”<...> We actually</i>

	<i>have some kind of change every year or every 2 years. So this is very annoying and it makes everything very unclear.</i>
Organic farmer_2	<i>Lithuania has no plan whatsoever. And not just for general farming but also for encouraging and developing organic farming. They [the government] are always like “let’s do something that way and then let’s see how it goes.”</i>
Organic farmer_3	<i>Most countries and most businesses support their farmers, and they buy from their farmers at a fair price and they do not import from other countries much. <...> Lithuania does not support us in the same way. Majority of the products leave the country. There is no relationship between us and the government. Nowadays, organic farms look like villains to many. <...> In order for them to plan for the future, as they say, they should firstly write something down. To this date, there are no plans, no structures, what will be the benefits, what is most worthwhile to do and where the direction is going.</i>
Organic farmer_4	<i>I think every government has some plans, but they don’t manage to warm up and gain the momentum. And then again the government changes and their plans are quite different. It seems like a chaos and there’s no plan.</i>
Organic farmer_5	<i>We expect that even somehow someone will have a plan towards where we are moving. We don't have it.</i>
Organic farmer_6	<i>There are no exact guidelines. It’s just “greening” out there. Is there a clear path towards that greener farming? What exactly is it? It is not explained clearly. Minimise fertilisers, minimise something else... Yet again there is no strategy.</i>
Organic farmer_7	<i>The relationship is like everywhere else. But sometimes it is quite conflicting with them [the government and the market] because they don’t know what they want.</i>
Conventional farmer_1	<i>The dialogue in general is not good. And in general it would be just nice to know that there is a certain continuity.</i>
Conventional farmer_2	<i>No strategy, no vision, no goal whatsoever.</i>
Conventional farmer_3	<i>The big farms dictate everything so whatever they say – it will be done by the state.</i>
Conventional farmer_4	<i>The giant farms are the ones who dictate the rules. So they [the government] are automatically looking at them without any consideration <...> and do not look into the small farms.</i>
Conventional farmer_5	<i>We need a clear vision of what we want to achieve and a clear plan and then we go for it. 4 years pass - everyone comes with their own thoughts, with their own desires and with their own visions. After the election, things are changing again. But if we had some kind of long-term plan between the election terms, all would be well. But now no one understands where we are going.</i>
Conventional farmer_6	<i>Every 4 years the government changes. And there is a saying: a new broom sweeps differently... New power comes – again things change.</i>
Conventional farmer_7	<i>We need some kind of guidelines. And not that for 5 years one government said something. Now a new government is saying “now we will ban diesel for you.” Well... all right. Everything changes, that’s ok. But there must be some preparation for that.</i>

Table 9. Lack of dialogue and instability in regulatory system as indicated by farmers. Full analysis of the interviews can be found in Appendix B. The table was created by the author.

5.2.3 Insufficient consumer demand

Lithuanian farmers do not consider the current consumer demand to be sufficient to encourage the expansion of the organic farming sector. They reported that lack of promotion and educational activities illustrating the importance of purchasing organic produce and the environmental benefits of organic farming contributes to the inability to engage and spread awareness among the consumers (Table 10). A stronger consumer base would motivate more farmers to switch to organic agriculture.

However, the farmers indicated that there is a sudden emergence of more environmentally-conscious people who are focused on healthier lifestyles leading to a gradual increase in consumer demand.

Farmer	Quotes from interviews showing consumer demand of organic produce in Lithuania
Organic farmer_1	<i>I see that generally those ads and education that we have right now are really not enough because still most of the advertising is not directed at it [organic product] because there is only a small part of the society that actually buys it.</i>
Organic farmer_2	<i>Vilnius [capital of Lithuania] has more money. They [organic farmers in Vilnius] may be able to take advantage of that. But where I live – people don't value organic products that much. Let's say in "Maxima" [the largest grocery chain in Lithuania]. They have that "organic corner" where there is refrigerator for organic meat and everything organic - you will rarely see any customer there.</i>
Organic farmer_3	<i>People who want to find organic products they can find it themselves. But even then, as I say, is a double-edged sword. People who want to find them are usually richer because our product is more expensive.</i>
Organic farmer_4	<i>Whoever wants to find it [information on organic products] – they will find it. But there are people who we cannot change and I don't want to change their attitudes or opinions. We need to focus on the young generation. <...> I can congratulate the Ministry of Agriculture, which now takes care of organic products for kindergartens and schools. This is a good step forward.</i>
Organic farmer_5	<i>It all starts with a lack of education, both for older and young people. For the older ones... well that is it – their "train" has left. But I think we should educate young generation about what is an organic product.</i>
Organic farmer_6	<i>Earlier days there was normal to talk about it. Now no one is talking about it. Well, we talk, but we don't teach. But this should really be included from kindergarten. Children need to be taught what to eat in order to be healthy.</i>
Organic farmer_7	<i>I think the promotion is way too less. Especially in Lithuania. People don't really trust the certificates. Not always.</i>

Table 10. Consumer demand in Lithuania as indicated by farmers. Full analysis of the interviews can be found in Appendix B. The table was created by the author.

5.3 Consumer survey in Lithuania: purchasing trends and awareness regarding organic products

The majority of respondents (63%) in the consumer survey indicated that they purchase organic produce from time to time. 26% stated that they do not while 11% did not care if their purchase was organically produced or not (Fig. 6).

Although the survey shows that the majority of respondents buy organic products, the frequency of purchasing may be a hindrance to the development of organic farming. Among the consumers who buy organic products, only 9% revealed that they try to buy organic products almost every time and 32% buy once or twice a week, while as many as 47% indicated that they buy it only once or twice a month and 12% were buying organic products very rarely (Fig. 6). Additionally, 84% of total survey respondents indicated that organic products were usually too expensive and they would be motivated to buy more if they were cheaper (Appendix C).

In spite of consumers investing in organic produce, there seems to be a lack of understanding of what constitutes an organic product and the origin of their purchase. 100% of respondents identified organic farming as a “type of farming that does not use any synthetic chemicals or excess fertilisers” (Appendix C) but a lot of them stated that they were not sure if their purchase was organic or not. Among the respondents who buy organic products, only 44% mentioned that they purchase officially certified organic products while 33% indicated that they buy from farmers that in their opinion could be a part of the officially certified organic farming sector but they were not entirely sure. A further 14% indicated that they were not sure if their purchase was officially certified and 6% indicated that they do not buy officially certified organic products (Fig. 6).

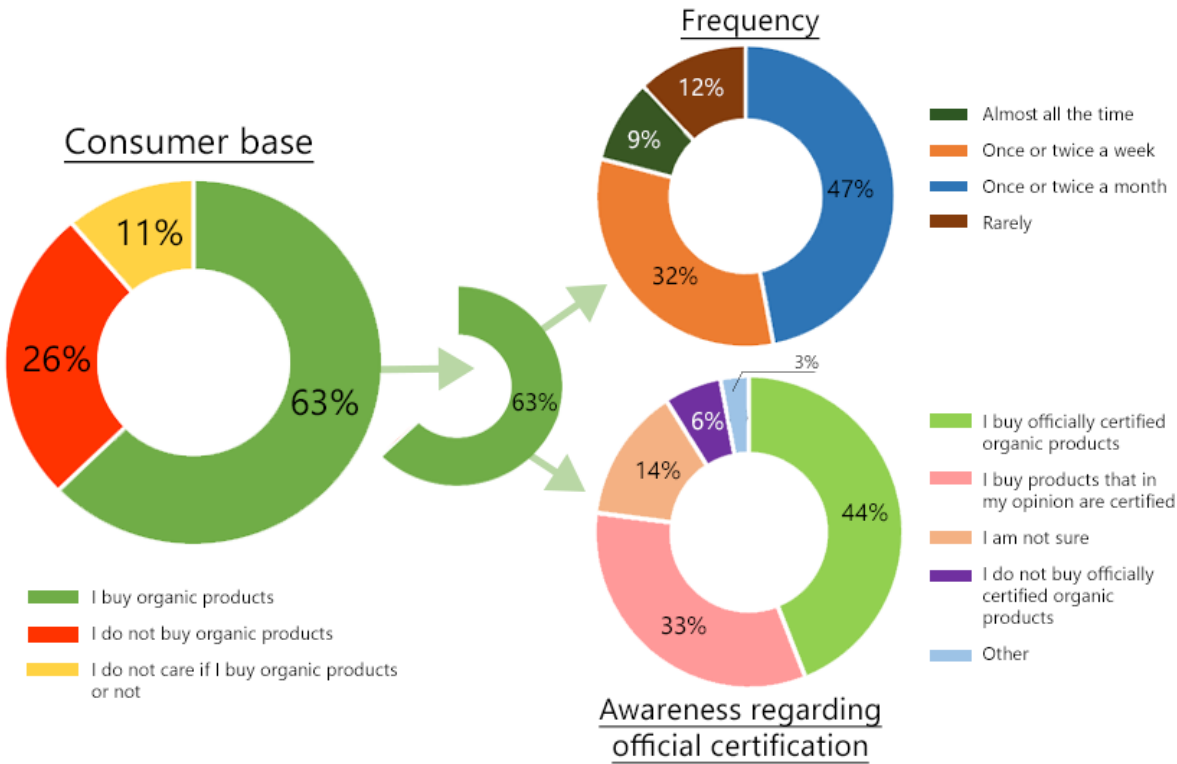


Figure 6. Consumer base, frequency in buying organic products and awareness regarding official certification. The data for the figure was taken from the consumer survey and created by the author (Appendix C).

The main motivations behind buying organic produce were environment and health. Consumers believe that organic production is more environmentally-friendly and healthier than the conventional counterparts. 86% of respondents indicated that they purchase organic products because it is more beneficial for the environment while 81% also indicated that they buy organic products because it is believed to be a healthier choice (Fig. 7). Around 11% stated other reasons like supporting local organic farmers and better nutrition for their children.

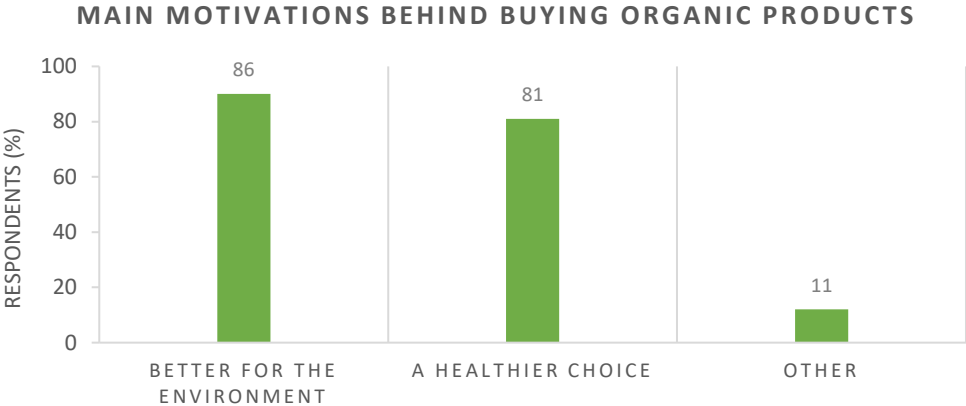


Figure 7. Main motivations behind buying organic products. The data for the figure was taken from the consumer survey devised by the author (Appendix C).

5.4 Development of organic farming in Lithuania in relation to the Six Step Theory

5.4.1 Development of organic farming in Lithuania over the years

To understand the institutional development of organic farming in Lithuania as per the Six Step Theory (RQ4) it is necessary to analyse the progress of the sector over the years in terms of the rate of growth of organic farming and its overall development within the institutional environment compared to conventional farming.

The total area under organic farming increased from only 5% of the total agricultural land in 2010 to about 8% of that in 2020 in Lithuania. While there has been an increase in area under organic farming, the total area under conventional farming is markedly higher and has increased by a steady rate of 6% (Fig. 8). From 2010 to 2020, the total farming area in Lithuania increased by 9% while the growth of area under organic farming increased by less than 3% of total area (0.3% annually on average) thus indicating the relatively slow transition towards organic farming practices. The total number of farms are decreasing in both organic and conventional farming sectors. It can be suggested that the larger and more intensive farms are more competitive, receive more benefits and greater access to larger investments.

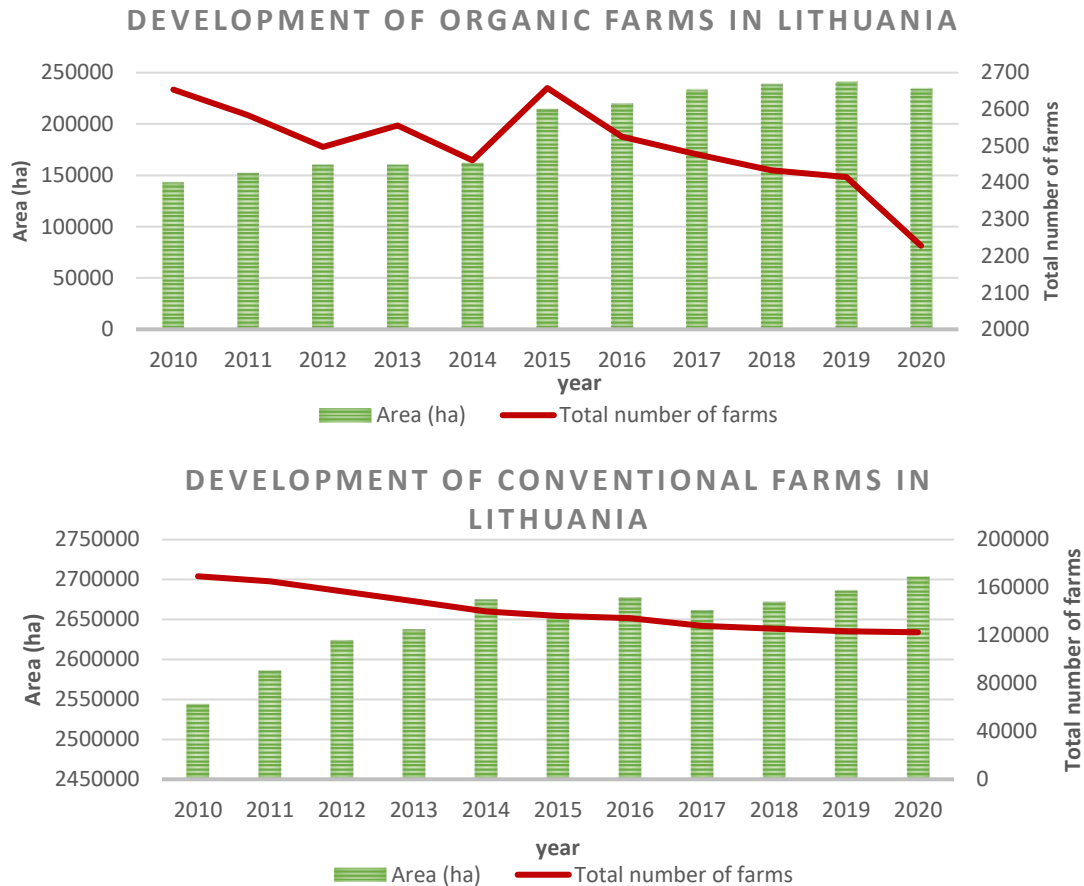


Figure 8. Development of organic and conventional farming in Lithuania (2010-2020). The figure shows the annual development of organic and conventional farms (hectares & total number of farms) in Lithuania. The tables were created by the author. The data was provided by public institution Ekoagros (data for organic farming) and Agricultural Information Center (data for conventional farming) (Appendix I).




NOTE: The data for organic farming included not only agriculture, but also aquaculture as the institution Ekoagros did not differentiate between the two. Therefore, I modified the data by subtracting the 6000 hectares and 14 farms (as recommended by Ekoagros) which belonged to aquaculture in order to demonstrate the data for organic agriculture only.

5.4.2 Six Step Theory on institutional development of organic farming in Lithuania

The interviews with the farmers and the consumer survey showed the obstacles that can be regarded as hindrances in regard to the development of the organic farming sector, namely lack of dialogue between the various stakeholders, instability in regulatory system, lack of future strategies and limited consumer demand. The Six Step Theory by Michelsen et al. (2001) assists in evaluating each essential step for the successful development of the organic farming sector in order to demonstrate the fulfilled, partially fulfilled and unfulfilled steps thus helping in better developmental initiatives within all three domains – farming community, agricultural policy and the food market. I evaluate that Step 1 has been fulfilled, Steps 2, 3, 4, 5 have been partially fulfilled and Step 6 remains unfulfilled due to multiple barriers in the institutional development of the organic farming sector in Lithuania (Table 11).

Steps	Characteristics of a successfully established step	Indicators of characteristics	Development in Lithuania	Result
Step 1: Establishment of the organic farming community	1.1 Robust identity of organic farming community	1.1.1 The introduction of organic farming as a concept (date)	1990. <i>Gaja</i> movement 1991. <i>Tatula</i> project 1993 establishment of first certified organic farms	
	1.2 Established organic farming associations	1.2.1 Associations for organic farmers exist	2 main associations: 1) Lithuanian Association of Organic Farms (LAOF) and 2) Lithuanian Association of Organic Livestock (LAOL)	
		1.2.2 Farmers who are a part of the associations	260 farmers belong to the LAOF 27 farmers belong to the LAOL	
Step 2: Establishment of political recognition	2.1 Regulations and governance in regard to organic farming exist	2.1.1 Introduction of the first national regulation regarding organic farming (date)	1994	
		2.1.2 Current regulations regarding organic farming (date)	2007	
	2.2 Procedures and strategies	2.2.1 Organic farming strategy is a part of general farming strategy in the country	Yes	
		2.2.2 Target to reach for organic farming in the country (%)	NO	
Step 3: Introduction of financial support	3.1 Financial support	3.1.1 Financial support is introduced (date)	1993	
	3.2 Area payments	3.2.1 Area payments exist	Yes (partially)	
		3.2.2 The amount provided for organic farming only (euro/ha)	Annual support for organic farming: 218-518EUR/ha. Annual support for the transition to organic farming: 238-534EUR/ha.	
	3.3 Research and innovation programme support	3.3.1 Research support designated for organic farming exists (euro/year)	32.7 million EUR (in 2015)	
		3.3.2 Range of research programme	Innovation fostering, cooperation, research strengthening and training.	
	3.4 Financial schemes and subsidies	3.4.1 Loans for organic farming exist	Yes	
		3.4.2 Tax reduction for organic farms exists	Yes	
3.4.3 Certification/inspection cost reimbursement		No		
Step 4: Development of	4.1 Cooperation (<i>pure co-operation, pure</i>)	4.1.1 Cooperation and dialogue between the farming community, agriculture policy, and the market exist	Yes (Partially)	Pure competition

non-competitive interrelationships	<i>competition and creative conflict</i>)			
	4.2 Inclusion of organic farming into official state institutions	4.2.1 Political body designated to represent organic farming community exists	Yes (Partially (Organic farming associations partially play the role of a political body)	
Step 5: Development of organic food market	5.1 Established supply chain for organic farming sector	5.1.1 Designated areas to process organic products exist	122 (in 2018).	
		5.1.2 The entire supply chain for organic production is established	Partially. Some of the facilities are considered to be not up to the standard.	
		5.1.3 Promotion of the organic products	Insufficient but increasing slowly.	
	5.2 Consumers choice and favour of organic production	5.2.1 Consumers understand the concept of organic farming	Yes	
		5.2.2 Consumers understand the value of certified product with the official logo	Partially.	
		5.2.3 Consumer acceptance of organic products (%)	63%	
		5.2.4 % of consumers who buy organic products more than once a week/ more than once a month/ lesser than once a month	9% + 32% = 41% - more than once a week; 47% - more than once a month; 12% - lesser than once a month;	
		5.2.5 Price acceptance (%)	84% of consumers do not agree with current prices.	
	5.3 Certification for organic products	5.3.1 Special organic product logo is used	The official logos are used.	
	5.4 Market share of organic products is large	5.4.1 Market share of organic products (total percent)	Around 1% (approximately 100 million euros).	
Step 6: Establishment of attentive and committed institutional setting	6.1 Inclusive space for dialogue regarding both parties and future action planning	6.1.1 Discussion arena is created	Partially	
		6.1.2 Future action plan for organic farming is set and/or constantly discussed	No	

Table 11. The Six Step Theory from Lithuanian perspective. The table represents the indicators and results used to evaluate Step 1-6. If the step is fully fulfilled it is represented by -  ; partially fulfilled -  ; unfulfilled -  . The table was created by the author. The data for the table was gathered from: 1.1.1, 1.2.1 Kaufmann et al. (2011); 1.2.2 Unpublished data received from LAOF and LAOL; 2.1.1; Lietuvos Respublikos Seimas (1994); 2.1.2 EUR-Lex (2007); 2.2.1 Melninkiene (2020); 3.1.1 Kaufmann et al. (2011); 3.2.1 Interviews, Ekoagros (2020) ; 3.2.2 NMA (2017); 3.3.1 Scown et al. (2020) 3.3.2 European Commission (2020a); 3.4.1 LZUKT (2021); 3.4.2 EUR-Lex (2006); 3.4.3 Ekoagros (2015); 4.1.1 & 4.2.1 LEUA (2014) & Interviews; 5.1.1 Ministry of Agriculture (2018); 5.1.2 Pekala (2019); 5.1.3 consumer survey, interviews, Ekoagros, 2020); 5.2.1, 5.2.2, 5.2.3, 5.2.4 & 5.2.5 Consumer survey & Pekala (2019); 5.3.1 Interviews & Pekala (2019); 5.4.1 Pekala (2019); 6.1.1 LEUA (2014); 6.2.1 Interviews.

Step 1: Establishment of the organic farming community

From the literature review, I identified key moments in the development of Step 1, including the introduction of organic farming as a concept (**Indicator 1.1.1**) in Lithuania in 1990 by the *Gaja* movement at the University of Agriculture in Lithuania followed by the *Tatula* project in 1991 which encouraged farmers to transition to organic farming and successfully establish the first organic farms in 1993 (Kaufmann et al., 2011) and thus I determined **Indicator 1.1.1** as complete.

I found two established organic farming associations (**Indicator 1.2.1, 1.2.2**) designated towards organic farmers in Lithuania: Lithuanian Association of Organic Farms (LAOF) - the larger, more active and consisting of 260 farmers, and Lithuanian Association of Organic Livestock (LAOL) – smaller and consisting of 27 farmers. I determined **Indicator 1.2.1** and **1.2.2** as complete.

Out of the 7 organic farmers who were interviewed, 4 were a part of one of the aforementioned associations, one of them was a part of LAOL and strongly considered in joining LAOF as well while the other 3 indicated that they had not joined these associations yet.

Taking into account the successful establishment of the concept of organic agriculture in Lithuania with a community of organic farmers engaging through two designated associations, I determined **Step 1** as fulfilled (Table 11).

Step 2: Establishment of political recognition

The first national regulation on organic farming (**Indicator 2.1.1**) was introduced by the Seimas (parliament) of the Republic of Lithuania in 1994 under “Law on the State Regulation of Economic Relations in Agriculture” (Lietuvos Respublikos Seimas, 1994). After joining the EU, Lithuania adopted the EU regulations (**Indicator 2.1.2**) and as any other Member State, adheres to the Council Regulation (EC) No 834/2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91 which was released in 2007 (EUR-Lex, 2007). Thus, I determined **Indicators 2.1.1 and 2.1.2** as complete.

Procedures and strategies for organic farming in Lithuania is integrated in the national general farming strategy (**Indicator 2.2.1**). It consists of basic EU targets to increase the development of agriculture, increase competitiveness and sustainable development among others (Melninkiene, 2020). However, I found that Lithuania does not have clear national targets for organic farming (**Indicator 2.2.2**). It also does not contain a set goal to reach a certain percentage of organic farmland within a stipulated time as indicated by the farmers which renders **Indicator 2.2.2** incomplete.

Taking into account the lack of strategies regarding organic farming, I determined **Step 2** as partially fulfilled (Table 11).

Step 3: Introduction of financial support

The financial support (**Indicator 3.1.1**) for organic farmers in Lithuania was introduced in 1993 (Kaufmann et al., 2011) and thus I determined the Indicator as complete.

Currently, Lithuanian organic farms receive CAP direct payments based on farm area and additional payments (**Indicator 3.2.1**) depending on their production. In 2014-2020 the additional payment for organically farmed areas in Lithuania was 218-518 EUR/ha and annual support for the transition to organic farming was around 238-534 EUR/ha (NMA, 2017) (**Indicator 3.2.2**). However, currently, the aforementioned financial support is only provided to the farms that were established before 2015. This issue was also emphasised by some of the farmers (Table 8, Section 5.2.1) and Ekoagros (2020a) as they indicated that the new organic farms did not receive the additional payments due to the lack of funds thus crippling the growth of the sector. Ekoagros (2020a) also emphasised on the need for better financing model from both the EU and the national government. **Indicator 3.2.2** is determined as complete as there is an established amount of funds for the organic farmers. However, **Indicator 3.2.1** remains partially complete as the newly established organic farms cannot receive additional area payments.

For the Rural Development Programme (RDP) 2014-2020, Lithuania received around 2.03 billion EUR (European Commission, 2020a) (**Indicator 3.3.1**). In 2015 around 33 million EUR was designated for research and innovation support for organic farming (**Indicator 3.3.2**) (Scown, Brady & Nicholas, 2020). It included innovation fostering, cooperation, research strengthening and training among others (European Commission, 2020a). Therefore, I determined **Indicators 3.3.1** and **3.3.2** as complete.

Financial schemes and subsidies exist in Lithuania in the form of preferential loans (**Indicator 3.4.1**) for different activities including innovation and modernisation of the farms (LZUKT, 2021). There are also subsidies and tax reduction (**Indicator 3.4.2**) “flat-rate” scheme as per EU Council Directive 2006/112/EC (EUR-Lex, 2006). However, farmers are required to pay certification and inspection costs (**Indicator 3.4.3**) depending on type and size of farms which are not being reimbursed (Ekoagros, 2015). Therefore, **Indicator 3.4.3** remains incomplete as the farmers are not being reimbursed for their certification and inspection costs.

Considering that 6 out of 8 indicators are complete but 1 is partially complete and 1 remains incomplete, I determined **Step 3** as partially fulfilled (Table 11).

Step 4: Development of non-competitive interrelationships

There are existing cooperation (**Indicator 4.1.1**) schemes between the three domains (Table 12). The Lithuanian Rural Development Program (RDP) is a governmental agricultural scheme which focuses on

rural development in the country and provides support for organic farms. However, farmers often indicated that the cooperation and dialogue between the three domains is lacking due to the very small size of the organic farming sector (Table 9; Section 5.2.2). Considering the limited cooperation between the three domains, I determined **Indicator 4.1.1** as partially complete.

The farmers stated that the representation of the organic community within the institutional environment (**Indicator 4.1.2**) is weak (Table 9, Section 5.2.2). There is no designated political body in the agricultural policy domain that would represent the organic farming sector. LAOF serves as a mediator by creating dialogue between farmers and relevant institutions and they try to influence the country’s agricultural policy. Along with LAOL, they try to unite the organic farms in Lithuania and represent their interests in policy-making, educate and inform the farmers on the updates and carry out educational activities. The farmers considered the relationship between the organic farming community and the market quite weak in spite of the supply and demand of organic products getting better of late in Lithuania (Table 10, Section 5.2.3). Due to the lack of representation of the organic farming sector within the agricultural policy and the food market domains, I determined **Indicator 4.1.2** as partially compete.

While analysing **Step 4** and the farmers’ accounts, I deciphered the prevalence of *pure competition* between the three domains due to limited co-operation, lack of dialogue and the need for institutions that would represent the organic farming community in the institutional environment (Table 3). Therefore, taking into account that this interrelationship is not as ideal as *creative conflict* for the growth of organic farming, I determined **Step 4** as partially fulfilled (Michelsen et al., 2001) (Table 11).

Domain	Institution	Role
The Farming community	Organic farmers	Farming practices that adhere to the organic farming rules
	Associations	Dialogue between the organic farming community and the other two domains; educational activities and promotional events
Agriculture policy	Ekogaros	Official certification/labelling body designated for organic farms/products/production facilities only
	Ministry of Agriculture	Rules and regulations; financial support; promotional activities
The food market	Consumers	Creating a strong consumer base; increasing demand
	Processing facilities	Processing organic produce according to the organic farming rules
	Retailers and Suppliers (private companies)	Ensure the competitive prices of organic products; promotion of the organic produce;

Table 12. Institutional setting or organic agriculture in Lithuania according to the three domains. The table was created adhering to the Michelsen et al. (2001, p.8) Six Step Theory and created by the author.

Step 5: Development of organic food market

There is an established supply chain for organic products in Lithuania. The number of organic production processing facilities (**Indicator 5.1.1**) in Lithuania is growing every year. In 2018 there were

122 companies designated only for organic production (Ministry of Agriculture, 2018). Although the Lithuanian organic food market is increasing by 10% every year, some of the production facilities do not meet the standards and organic products are often devalued and sold as conventional products (Pekala, 2019) thus showing that **Indicator 5.1.2** is only partially complete.

I found that the general awareness towards promotion of organic produce and farming was quite inadequate (**Indicator 5.1.3**). 81% of consumers stated that there was not enough promotion or raise in public awareness (Appendix C) and this notion was also supported by the organic farmers (Table 10, Section 5.2.3). Conventional farmers also suggested that low consumer demand was a hindrance towards the growth of organic farming (Table 6, Section 5.2).

There have been some national initiatives from the Ministry of Agriculture recently towards better promotion by supplying products from organic farms into some of the schools, kindergartens, hospitals and restaurants (Ekoagros, 2020b) that can go a long way in increasing public awareness and encouraging consumers to support organic agriculture. Both **Indicators 5.1.2 and 5.1.3** are partially complete as some of the production facilities are not up to the standard and organic products are not promoted sufficiently.

Increased awareness among consumers is encouraging them to favour organic production resulting in a gradual increase in demand. 44% of survey respondents buy officially certified organic products (Fig. 6, Section 5.3). However, 33% of respondents stated that they bought products which they thought were organically produced and a further 14% mentioned that they were not sure if their purchase were certified organic products. Thus, it can be inferred that a major chunk of the population might not be able to identify if their purchase was indeed organic (**Indicator 5.2.2**). 41% respondents indicated that they buy organic products more than once a week while as many as 47% indicated that they purchase it more than once a month and 12% were buying organic products less than once a month (Fig. 6, Section 5.3) (**Indicator 5.2.4**). 84% specified that organic products were too expensive and a reduction in the price would increase the demand (Appendix C) (**Indicator 5.2.5**). The lack of awareness regarding certification of organic products, the majority of consumers not buying organic products at least once a week and the overwhelming majority of consumers finding the current prices exorbitant have rendered **Indicators 5.2.2 and 5.2.4** partially complete and **Indicator 5.2.5** incomplete respectively.

The official EU (EU organic logo) and Lithuanian logo (*Ekologinis Žemės Ūkis*) on products help in raising awareness and increasing visibility of the organic food in the market (**Indicator 5.3.1**) (Fig. 9). However, around 90% to 100% of organic food is sold as raw material via the retail channel. Low consumer



LT-EKO-001
ES žemės ūkis



Figure 9. Organic production logo. The figure shows the organic production logo of EU (left) and national organic production logo (right). Both of them are used in Lithuania. VMVT (2017).

demand causes the domestic production to be exported (95%) and farmers rarely sell their products directly to the customer (Pekala, 2019). The organic share constitutes of around 1% of the entire retail food market (**Indicator 5.4.1**) which is estimated to be around 100 million EUR annually (Pekala, 2019). The market share for organic products is not large thus resulting in **Indicator 5.4.1** remaining incomplete.

Considering that 3 out of 10 indicators are complete, 4 out of 10 indicators are partially complete, but only 2 out of 10 remains incomplete, I determined **Step 5** as partially fulfilled.

Step 6: Establishment of attentive and committed institutional setting

An inclusive space for dialogue regarding the three domains and future action planning exists but there has been limited discussion between the different institutions and the organic farming sector (**Indicator 6.1.1**). The Strategic Action Plan for 2021-2023 contains only a sentence mentioning the need for development of organic farming in Lithuania (Lietuvos Respublikos Žemės ūkio ministerija, 2020). The lack of dialogue is closely related to the absence of strategies directed towards organic farming and the constantly changing regulations thus portraying the inadequacy in institutional development needed to support the growth of the organic sector (**Indicator 6.1.2**).

The farmers indicated that in spite of the existence of associations for dialogue and representation, there has been limited connection between the various domains and lack of constant discussions in regard to the Future Action Plan for organic farming thus rendering **Indicator 6.1.1** as partially complete and **Indicator 6.1.2** as incomplete respectively. Thus, I determined **Step 6** to be unfulfilled.

5.5. The main barriers of organic farming in Lithuania

The interviews with Lithuanian farmers, the consumer survey and the institutional developmental analysis indicate the lack of institutional involvement in the development of the organic farming sector. I determined that only step 1 has been fulfilled, steps 2, 3, 4 and 5 are partially fulfilled while step 6 remains unfulfilled (Fig. 10).

Considering the clauses in the Six Step Theory I identified the following 4 interconnected barriers which hinders successful development of organic farming sector in Lithuania:

- 1. Insufficient and unclear strategies and ever-changing regulations (**Indicators 2.2.2** (target to reach organic farming in the country (%)) & **6.1.2** (future action plan for organic farming));
- 2. Lack of financial support (**Indicators 3.2.1** (area payments) & **3.4.3** (certification and inspection costs));
- 3. Limited dialogue between stakeholders (**Indicators 4.1.1** (cooperation and dialogue between the farming community, agriculture policy and the market), **4.1.2** (Political party designated to represent organic farming community) & **6.1.1** (discussion arena));
- 4. Lack of awareness, limited promotion and low consumer demand (**Indicators 5.1.2** (entire supply chain for organic farming), **5.1.3** (promotion of organic products), **5.2.2** (consumers understanding the value of certified product with the official logo), **5.2.2** (% of consumers who buy organic products more than once a week / more than once a month / lesser than once a month), **5.2.5** (price acceptance) & **5.4.1** (Market share of organic products (%))).

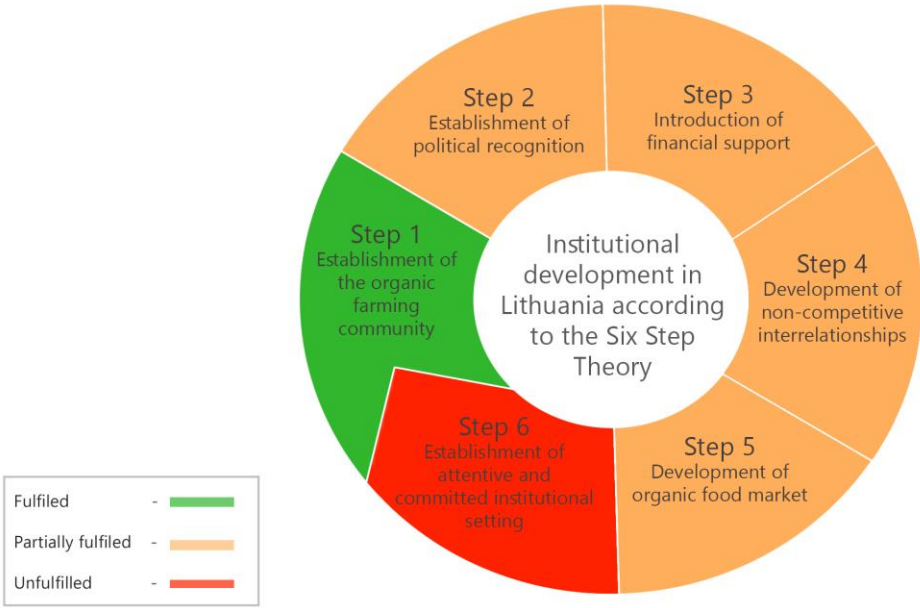


Figure 10. Institutional development in Lithuania of organic farming sector according to the Six Step Theory. The figure represents the fulfilment of each step adhering to the institutional development in the country. The figure was created by the author.

6 Discussion and Recommendations

I found that organic agriculture tends to have lower annual nutrient leaching levels for Nitrogen (38%) and Phosphorus (22%) than their conventional counterparts respectively (RQ1). Although organic farming has the potential to reduce harmful algal blooms due to lower nutrient leaching, the

development of the sector is considered to be relatively slow. The interviews with the farmers indicated possible barriers regarding switching to or starting an organic farm (RQ2) especially with the lack of financial support and dialogue between the three domains and low consumer demand. The consumer survey helped to identify the possible hindrances (namely lack of awareness and high prices) in establishing sufficient demand required to support the growth of organic agriculture (RQ3). The interviews and the survey contributed in the analysis of the institutional development of the organic farming sector in Lithuania within the Six Step Theory (RQ4).

6.1 Nutrient leaching from organic and conventional agriculture

Organic farming has the potential to reduce eutrophication in the Baltic Sea and the Curonian Lagoon. The results identify that organic farming is more beneficial in regard to retaining nitrogen and phosphorus in the soil while conventional farming causes larger amounts of nutrient leaching (RQ1). In conventional farming, there are frequent instances of over-fertilising farmlands thus deteriorating humus and overall quality of the soil (Fammler et al., 2018). However, organic farming does not imply simply replacing chemical fertilisers with the same amount of organic fertilisers but actually reducing the amount as much as possible while trying to meet the crop needs (Seufert et al., 2017). Organically farmed areas tend to enrich the soil with only the necessary amounts of nutrients, thus enhancing the quality of humus and improving the ability of the soil to retain necessary nutrients (HELCOM, 2020c).

Currently, it is difficult to ascertain the extent to which organic farms in Lithuania can reduce eutrophication in the Baltic Sea because the number and area under organic farming (8% of total farmland) are too small to determine their effect at a national scale (Fig. 8, Section 5.4.1). A larger proportion of organic farms in the country would be more likely to lower overall nutrient leaching levels. Field studies comparing nutrient pollution from organic and conventional farms in Lithuania would help establish the potential reductions specifically.

It is also worth noting that organic farms still leach nitrogen and phosphorus (Fig. 4 & 5, section 5.1) though at lower levels than conventional farms. Different factors that affect nutrient leaching include soil type and depth, crop rotation (Benoit et al., 2014; Kirchmann & Bergström, 2001), appropriate fertilisation (Kelm, Loges & Taube, 2008) and precipitation levels (Buciene, 2008). Nutrient management strategies from both types of farms must be carefully evaluated to reduce overall leaching.

Pollution of nitrogen and phosphorus from agriculture take time to decline considering the time lag in the polluting nutrients from the farms reaching the Baltic Sea. Nitrogen and phosphorus pollution originating from agriculture may not be noticeable for years or decades depending on characteristics of the soil, crops in the area and precipitation levels (Moxey, 2012). The lack of research about the

time lag regarding nutrient leaching and its impact on eutrophication is often emphasised as one of the reasons behind the inability to devise solutions towards proper nutrient leaching management (Withers et al., 2014). Therefore, the true effects of the ongoing increase in total area under conventional farming in Lithuania may only show detrimental effects on the Baltic Sea after several years, or during excess precipitation as was seen in 2017. Moreover, it is estimated that eutrophication in the Baltic Sea will increase due to rise in surface temperatures and higher precipitation levels in the near future as a result of climate change (Withers et al., 2014).

The evidence showing lower nutrient leaching in organic farms points towards the importance of developing more organic farms. If Lithuania would promote the conversion of conventional farms into organic by carefully managing the farms as well as incorporating innovative ideas and cultivating sustainable farming practices, the eutrophication tendencies in the Baltic Sea can be reduced over time (HELCOM, 2020b).

I was only able to find 8 studies that met my criteria and further studies on nutrient leaching comparing both organic and conventional farming in various crops and livestock farming in different types of soil especially sandy, loamy and clay are recommended to devise better techniques and strategies to reduce nutrient leaching (Fig. 4 & 5, Section 5.1).

6.2 Tackling the 4 identified barriers in organic farming in Lithuania

The unwillingness to switch to organic farming and consequent slow growth of the sector is closely related to the limited institutional development in Lithuania thus suggesting the need for developing institutions to support the already-existing organic farms and helping other farmers in making the transition. From the data collected from farmer interviews (RQ2), consumer survey (RQ3) and analysis of the Six Step Theory (RQ4), I identified that the organic farming sector in Lithuania is stagnating due to these 4 main barriers that impede the complete fulfilment of steps 2, 3, 4, 5 and 6 of the Six Step Theory.

6.2.1 Insufficient and unclear strategies and ever-changing regulations

A long-term action plan is necessary to establish an efficient and competitive organic farming system in Lithuania which lacks established future targets in regard to organic farming (Table 9, Section 5.2.2; Pekala, 2019). Some of the EU countries have already established clear goals and tangible targets to increase their organic farmlands: 30% in Sweden (European Commission, 2020b) and Denmark (Pekala, 2019) and 20% in Germany by 2030 respectively (BMEL, 2021). Establishing a concrete future target for organic farming helps in developing strategies and regulations which would aid in improved institutional development (Pekala, 2019). Additionally, instability and frequent changes in the

regulatory system create a sense of uncertainty among the conventional farmers, thus discouraging them from transitioning into organic farming (Bajarunaite-Lasiene, 2012).

The absence of clear future strategies in Lithuania could be related to the ever-changing agricultural policies. Every country in the EU establishes their national regulations differently to adhere to the general EU regulations (Michelsen et al., 2001) which explains why the organic farming sector is more developed in some EU countries than others. The interviewed farmers reported that constantly changing agricultural policies and lack of stability were a hindrance for conventional farmers to consider moving towards organic practices (Table 9, Section 5.2.2) thus resulting in slow growth of the sector.

One of the main stakeholders under the agricultural policy domain, the Ministry of Agriculture in Lithuania is responsible for developing clear future strategies while preventing sudden regulatory changes. Implementing stronger regulations and setting up a straightforward future strategy for organic agriculture showed positive results in the growth of organic farming sector in several EU countries such as Austria, Italy and Denmark among others (Michelsen et al., 2001). Developing a clear pathway towards a steady growth of organic farming in Lithuania would potentially increase the motivation of farmers to consider moving towards organic farming.

6.2.2 Lack of financial support

The majority of the interviewed farmers identified the lack of financial support through area payments as a major barrier in establishing or further developing already existing organic farms in Lithuania (Table 7, Sector 5.2.1). In addition to the interviewees, recently published studies have also discussed additional area payments as a major barrier in the development of organic farming (Smol et al., 2020; Kaufmann et al., 2011; Larsson et al., 2013).

The financial support from the EU is an essential part in the transition towards organic farming for its Member States. It can be seen from the increase in organic farming in Lithuania after it joined the EU in 2004 which allowed the organic farmers to receive additional area payments (Kaufmann, 2011). Currently, the additional payments for organic farmers exist but the main issue is the insufficient funds for the new farmers. For the Rural Development Program of 2014-2020, Lithuania received more financial support than in the previous years which encouraged more organic farmers to become officially certified (Fi-compass, 2020) and lead to the sudden increase in organic farming area in 2015 (Fig. 8, Section 5.4.1). In 2015, the EU organic farming giant AUGA group consisting of around 24 000 hectares was established in Lithuania. The sudden growth of organic sector in 2015 quickly depleted the designated funds thus depriving the new organic farmers from additional area payments (Ekoagros, 2020a) and creating complications within the approved funds for the duration of the RDP.

None of the official reports from national agencies mention it, but the lack of funds are widely acknowledged in the news. The national news portals often emphasise that new farmers are not able to receive additional payments due to the lack of funds and improper distribution of payments (Manoukis, 2020; Delfi, 2019; Valstietis, 2019) and it is also discussed amongst the farming communities. 6 out of 14 interviewed farmers (organic farmer 1, 3, 7 and conventional farmer 2, 5, 6) acknowledged it as a major issue in the current financial support system in Lithuania (Table 8, Section 5.2.1). Therefore, it is imperative that the agricultural policy domain should monitor how Lithuania allocates its funding in the future, and consider protection or prioritization for small domestic farmers to ensure that they benefit from the scheme (Ekoagros, 2020a; Table 8, Section 5.2.1).

It is essential to establish adequate financial support for the development of organic farming across different sizes and types of farms in Lithuania (Kaufman et al., 2011; Balezentis et al., 2019; Table 7, Section 5.2.1). Studies in other EU countries as per the Six Step Theory indicated that adequate financial support schemes and higher payments encouraged the growth of the respective organic farming sectors (Michelsen et al., 2001). Currently, Lithuania is adopting the new RDP for 2021-2027 and it is essential for the government to reevaluate payment strategies and appropriate distribution of funds that would support the overall growth of the organic farming sector.

6.2.3 Limited dialogue between stakeholders

There is limited dialogue between the three domains of organic farming in Lithuania and their interrelationship can be inferred as *pure competition*. The absence of appropriate strategies and constantly changing regulations can be traced back to the lack of discussion between farmers, policy, and the market stakeholders. Although farmers and their opinions are usually represented by the two main associations – Lithuanian Association for Organic Farms and Lithuanian Association for Organic Livestock, there is no designated political body assigned exclusively for the organic farming sector in Lithuania.

During the interviews, the farmers also indicated the lack of communication and negligence from the institutions as different types of farms are not taken into consideration while creating regulations or distributing funds (Table 7, Section 5.2.1; Table 9, Section 5.2.2). It was suggested that the large intensive farms received more support nationally and from the EU since the majority of payments under the CAP are based on farm size, thus benefitting larger farms (Scown et al., 2020). Therefore, the current regulations benefit the large intensive farms as they are more economically beneficial to the country and the EU (Tynkkynen et al., 2014) which explains the lack of focus on the smaller and less economically viable organic farms.

Going forward, the most beneficial solution would be to establish the characteristics of *creative conflict* in Lithuania which has been indicated to be the most conducive for the development of organic farming sector (Michelsen et al., 2001). *Creative conflict* is identified by an “unstable situation” which brings about constant collaboration between the organic farming sector and corresponding institutions thus creating a discussion arena to solve the issues and uncertainties (Michelsen et al., 2001, p.12; Larsson et al., 2013). In Denmark, establishing a political body (Organic Farming Council) to represent the organic farms within the agricultural policy and the food market domains has strengthened the identity and increased the development of the organic sector other than encouraging the switch towards *creative conflict* interrelationship (Michelsen et al. 2001). Thus, it can be suggested that establishing an official political entity to represent the organic farming sector within the Ministry of Agriculture in Lithuania would help in establishing *creative conflict* and potentially contribute to the institutional development of the organic farming sector by bringing balance between the three domains.

6.2.4 Lack of awareness, limited promotion and low consumer demand

Supply is closely related to consumer choices and willingness to buy organic products. An aware and active consumer base has been previously identified as being one of the main motivations for farmers to transition to organic farming (Michelsen et al., 2001; Seufert et al., 2017). My survey indicates that the majority of Lithuanian consumers buy organic produce infrequently (once or twice a month) among most of the consumers (Fig. 6, Section 5.3). This cannot be considered sufficient to develop satisfactory consumer demand to support the growth of organic farming.

The lack of demand can be also attributed to the limited promotion and lack of awareness of organic products. The Lithuanian consumer survey identified that among the respondents who buy organic products, 44% purchase officially certified organic products. However, 47% of them buy products that they think are from certified organic sources or they were not sure. Recent studies have shown that consumers are often confused between organic production logos and other logos such as Label of Exceptional Quality which promotes local production in Lithuania but it is not related to organically grown products (Pekala, 2019). Previous studies found that confusion regarding labelling is a major issue because it developed distrust among the consumers and a notion that organic products were often not actually organically produced (Pekala, 2019). It is essential that if the consumer wishes to purchase organic produce, they can tell the difference between the organic and other products in order to increase consumer demand and indirectly promote the growth of officially certified organic farms who adhere to the EU and national regulations of organic farming.

There is a need for constant evaluation of supply and demand while trying to understand the needs of consumers in Lithuania. With the emergence of different kinds of promotions such as organic food

supply for multiple establishments including schools and hospitals in Lithuania, the consumer base for organic production is projected to grow (European Commission, n.d.; Table 10, Section 5.2.3). However, the lack of sufficient promotion is still seen as a barrier as the organic share of total food retail is as low as around 1% due to low consumer demand and a lot of the organic produce from the farmers are exported as raw materials (Pekala, 2019). The institutions from two domains of agricultural policy and food market in Lithuania must focus on more engaging educational and promotional activities to raise consumer demand that will increase the organic farming production.

6.3 Limitations of the thesis

There is an evident lack of scientific articles and case studies about Lithuania and specifically regarding organic farming and eutrophication tendencies in the coastal areas of the country. Therefore, I had to refer mainly to the statistical data from various databases and reports from national institutions. The data comparing nutrient leaching between organic and conventional farming was very limited and therefore, I relied on the peer-reviewed articles that were available online which included nutrient levels from different EU countries.

Due to the COVID-19, the interviews with farmers were conducted online. This served as a hindrance since some farmers did not agree to participate in the interview due to technical limitations. Findings from this study need to be corroborated with larger groups of farmers with different sizes of farms growing wider variety of crops in various kinds of soil in multiple regions of Lithuania. Due to the COVID-19, I was able to reach only younger audiences and farmers who were able to communicate online. However, a follow-up to conduct in-person interviews with more experienced farmers could be recommended.

In order to get a better understanding of consumer base, their concerns and possible hindrances to the development of organic farming in Lithuania, consumer surveys with larger numbers of participants from multiple socio-economic backgrounds irrespective of age, gender and location could be recommended.

7 Conclusion

Eutrophication is a global issue which causes devastating effects on biodiversity, overall water quality, and socioeconomic activities of the affected regions. In order to combat eutrophication in Lithuania, it is necessary to decrease excess nitrogen and phosphorus leaching from agriculture. Taking into consideration that the total area under agriculture is constantly increasing in Lithuania and the organic farming sector is not developing at a desired rate, it can be suggested that reducing eutrophication in

the Baltic Sea would become a major challenge if appropriate measures are not taken by the various stakeholders to promote and support the growth of the organic farming sector.

I am able to suggest from available data that switching to organic farming would potentially reduce eutrophic tendencies in the Baltic Sea and the Curonian Lagoon in coastal Lithuania. The results from organic farms and their conventional counterparts show that organic farming usually has around 30% lower nutrient leaching. Considering overall lower nutrient levels from organic agriculture, Lithuania must prioritise the development of the organic farming sector to reduce harmful algal blooms.

At the moment, the development of organic farms in Lithuania is slow due to insufficient institutional development. I used the interviews with farmers, consumer survey and the Six Step Theory by Michelsen to identify 4 main barriers hindering the development of organic farming in Lithuania: 1) insufficient and unclear strategies and ever-changing regulations, 2) lack of financial support, 3) Limited dialogue between stakeholders, 4) Lack of awareness, limited promotion and low consumer demand.

In order to fulfil the criteria for institutional development of organic farming as per the Six Step Theory and overcome the aforementioned barriers, the various stakeholders in Lithuania could work in pursuing solutions related to improved governance and better financial schemes, establish a political entity to represent the organic farming community within the agricultural policy domain and raise awareness amongst the consumers. It is essential that the three domains establish strong interrelationships and diverse stakeholder collaboration between each other thus establishing *creative conflict* as per the Six Step Theory in order to develop the organic farming sector.

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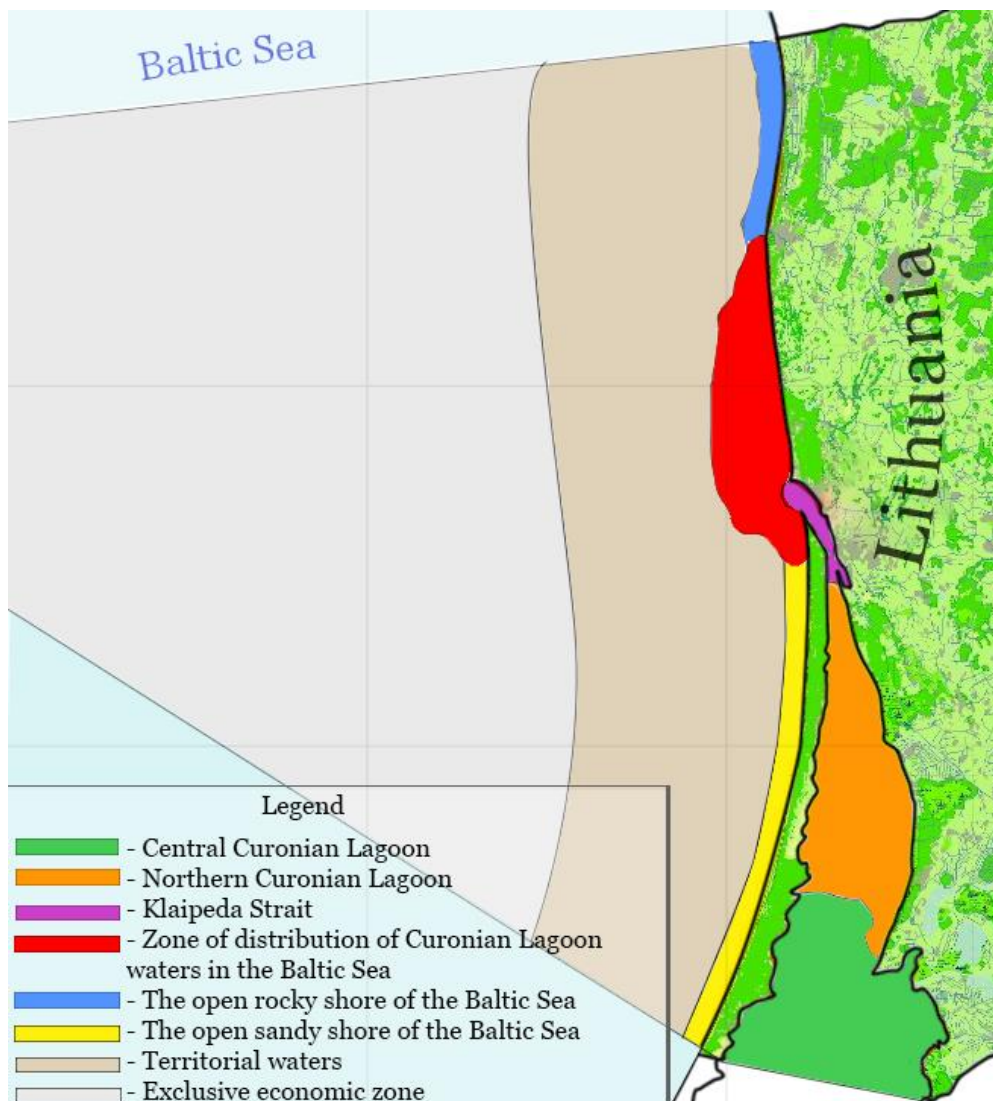
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9 Appendices

Appendix A. The coastal areas of Lithuania

The map represents the coastal areas of Lithuania as showcased in the Table 1. The coastal areas of the country consists of 8 main areas: 1) Central Curonian Lagoon; 2) Northern Curonian Lagoon; 3) Klaipeda strait; 4) Zone of distribution of Curonian Lagoon waters in the Baltic Sea; 5) The open rocky shore of the Baltic Sea; 6) the open sandy shore of the Baltic Sea; 7) Territorial waters; 8) Exclusive economic zone.



Appendix B Interview Analysis (translated from Lithuanian)

The following table shows the every step of the Six Step Theory, corresponding interview questions and the answers from the interviews. The numbering system in the “Interview Questions” section in the table indicate the usual order the questions were asked. The order was chosen by the author in order to start with the basic questions and move towards the more complex ones. It should be also noted that in this case the answer may fit more than one step in the Six Step Theory as it is indicated in the Appendix 2.2 however, it is chosen to be represented in one section in this table since it did not have any particular relevance for the results. **The yellow-marked quotes were used in the thesis text above.**

Six Step Theory	Interview Questions	Corresponding answer from the interviews
Step 1: Establishment of an organic community	1. What do you farm? How long have you been in this industry/business?	The question was irrelevant to the Six Step Theory. The question was needed to “warm up” the interviewee.
	2.1 Why did you choose to start or switch to organic farming? What was the main motivation? (Q ONLY FOR ORGANIC FARMERS)	Organic Farmer_1. I started from conventional farming in 2005 but then became organic in 2015. There were two main motivations. <...> I started an animal husbandry which then it was much easier to switch to organic farming because the main motivation was to get the most benefit out of it. <...> and the second one was, of course, the financial benefits.
		Organic Farmer_2. My grandmother started from the very first days, as soon as organic farming became a concept in Lithuania. However, all our lives we were farming organically in that sense that we did not spray or put any chemicals. And then started doing it according to the EU standard which was no different from the way we did it everything before. Organic farming for me is innate, that's how it got organic.
		Organic Farmer_3. Well I am doing this for a long time. And one thing that motivated me was the cost-effectiveness. And another thing that it is a higher quality product and I also thought that there will be more opportunities in one area or another to develop and expand.
		Organic Farmer_4. I don't really like chemicals. I always knew I was going to college and then going back to the village and I didn't really know what I will do. But I wanted to live in a village, where the air is healthy, where my children could play.
		Organic Farmer_5. I guess like everyone else. We jumped into that train and we just went from there.
		Organic Farmer_6. I came just for nature because I really wanted to live ecologically clean. <...> and then you start to think what to do and how to feed yourself and family in a healthy way.
		Organic Farmer_7. My parents were the ones who started so I simply go after them.
	13. Are you a part of any of those organic farming associations? (Q ONLY FOR ORGANIC FARMERS)	Organic Farmer_1. Actually I am not but I am strongly considering about joining them. But I am a part of the smaller one which involves farmers who grow organic cattle.
		Organic Farmer_2. No. I am not part of any association. I like to be on my own.
		Organic Farmer_3. No I am not. I am not even really sure what those associations are doing.
		Organic Farmer_4. No. I am not. One of my family member is. So as a farm we do belong to one of the associations.
		Organic Farmer_5. Yeah. I am. I would say it is good. We get a lot of information, updates, they go and represent our voices.
Organic Farmer_6. Yeah. I am a part of one. I like it. We get seminars, and information and all other useful stuff.		
Organic Farmer_7. Yeah. I am. I don't know. I personally would say that there is not enough communication between them and us. There is simply too many of them there.		
2.2 Have you thought about switching to organic farming? (Q ONLY FOR CONVENTIONAL FARMERS)	Conventional Farmer_1. I have a lot of hesitation about organic production. Let's say when buying products directly from an organic farm, I agree that may be organic, but what we buy in supermarkets, I have very serious doubts about how much organic it is. Secondly, organic farming is a really sincere and hard work in the fields. We have a couple of farms nearby that are organic. They have weeds growing there and then they have extra cost to spend in the fields fighting the weeds and then we are affected. So I don't know...	
	Conventional Farmer_2. Absolutely not. I don't feel the need to do it. Because as far as I notice the market is very small and narrow.	
	Conventional Farmer_3. We are actually trying to do it like in the organic farm but we simply do not certify it.	
	Conventional Farmer_4. I don't think about it. Because it does not pay much in terms of cost of production. There are organic farms around here, but when I talk to them... Well, we live better.	
	Conventional Farmer_5. Not really. This is in the past, when the EU once supported organic farms. Now organic farms, I think, are declining in Lithuania because those area payments have fallen very sharply. And that organic product fashion is more of a city thing. Lithuania's organic economy will not feed the world. Not at all. Yields differ practically three, maybe four times from a conventional farm.	

		<p>Conventional Farmer_6. God knows. There was some kind of thing that they [the government] didn't allow farms to switch to organic... This is very discouraging [to switch]. I think organic produce is nice. It's just you cannot feed everyone with it.</p> <p>Conventional Farmer_7. It remains an open question and we do not discuss it. But we do think about using less chemicals and fertilizers. But that is enough.</p>
	<p>2.3. If THESE concerns are addressed, would you like to switch to organic farming? (Q ONLY FOR CONVENTIONAL FARMERS)</p>	<p>Conventional Farmer_1. I'm not in favour of organic farming, but I think that a conventional farm should have a sustainable approach, in the sense that they need to reduce the use of fertilizers maybe lesser spraying [chemicals]. I think I would like to invest more in this kind of matter and then have that product which, in my opinion, is not worse than organic.</p> <p>Conventional Farmer_2. I mean if the need and market would increase then maybe. Otherwise this is probably a very small chance.</p> <p>Conventional Farmer_3. We were officially certified before but it just requires too much of your time and it is not like we sold more if we were certified. Too much paperwork. One for accounting, one for veterinary. Way too many reports. Simple as that. We do not certify and for that we don't get this mountain of papers.</p> <p>Conventional Farmer_4. Well, if we would make more money out of it, that's fine. Would you go to a job which paid lesser? Everything is based on that.</p> <p>Conventional Farmer_5. There is no motivation to switch to organic farming. And that land... There is an eternal dispute there between organic farmers and those who are more depleted of land. But a conventional farm is fertilized all the time, we give back what we've take from it. And the organic sucks from it sucks nutrients out of it and then with time they just deplete that land. And they don't grow anything there.</p> <p>Conventional Farmer_6. I don't know, you know, you need to work a lot to get there and that organic farm... <...> You still get more money for the production. Basically if it is organic, it is much lower. It doesn't pay off. For me, it is much cheaper to spray chemicals and cultivate more per hectare while doing conventional farming than organic.</p> <p>Conventional Farmer_7. So far I would say there are two main factors why I don't switch. One is profitability. In general, income from organic farms is lower. Then you need to look for customers who could buy. Second, maybe the fact that there is too little education, too little interest. <...> at the moment I do not think about it. Future will tell.</p>
<p>Step 2: Establishment of political recognition</p>	<p>Interview questions are not applicable for this step of the Six Step Theory</p>	
<p>Step 3: Establishment of financial support</p>	<p>7. What do you think of the current financial support?</p>	<p>Organic Farmer_1. Well... it's there. I cannot say otherwise. Also the additional bonus. If you compare it with the usual payments you can feel the difference, of course.</p> <p>The question could be discussed in a very different position as far as small farms are concerned, which, as you say "without a large working area". Those direct payments they are additionally linked to (INNAUDIBLE). So let's say in our case subsidizing beef cattle it is identical whether it is organic or not. The payment is for every cattle. The biggest difference is in the area. And if you don't have a lot of area then it probably seems like that the payment isn't a lot. Big farms should probably say that it is enough and should not complain.</p> <p>Organic Farmer_2. Yes. So there is that additional financial support. I am not complaining. But there is so much other issues with document filling and reports.</p> <p>Organic Farmer_3. It was much better before.</p> <p>Organic Farmer_4. In general, I do not know what percentage of support from Europe there is in Lithuania and it is very much needed. It is available and we should already recalculate how much we use them. And the financial support for organic... Well... it's basically nothing.</p> <p>Organic Farmer_5. It is all such a big bureaucracy. Until we start declaring, we don't know exactly how much we will get. For example now I cannot even add new fields to organically farmed areas because they simply won't be organic according to the rules.</p> <p>Organic Farmer_6. No opinion. Simply because at the moment we are not getting them even if we are officially doing organic farming. We made a mistake and they took away the funding.</p> <p>Organic Farmer_7. I think it is extremely necessary. When I started 10 years ago it was not so expensive to do organic farming. But now it is quite expensive and our production automatically became cheaper. So the financial support is very necessary.</p> <p><...></p> <p>Conventional Farmer_1. What is missing in Lithuania, first of all, is security in the tax system. Taxes actually change or increase for farmers almost every year. <...> But the area payments, I would say, are quite good. I wouldn't have very serious complaints about it. What I would like - well I don't know how to solve it. But I think financing should somehow be taken from those so-called "sofa farmers", or those people who declare, say, the crops themselves, receive payments and don't bother about anything else. These are the main problems.</p> <p>Conventional Farmer_2. There is only a small percentage to that national support. The main is EU money. So maybe two aspects: 1) it is quite hard to get that financial support if you somehow not in the list of what they need from you. <...> so that is one thing - that availability. Another thing: Absolutely aimless spending of money on anything for different things which is not I think related to the farming.</p> <p>Conventional Farmer_3. Difficult question indeed. Statistically, there are very few large farms, but they are very large and they gather all that funding. All that support. And for example where we declare the land there and get compensation for those lands... it is funny. Because they [large farms] gather all the payments and we have only 9 hectares so I don't remember exactly how much we get but about 3000 euros. It's not even really enough to buy animal feed.</p>

		<p>Conventional Farmer_4. Well they pay those benefits. As for the projects - we are not really qualified for them. It is maybe more for livestock farmers. We still have obligations for these benefits. How much the state contributes to this... Well... There is no way to earn as much as you would like, let's just say it like that.</p> <p>Conventional Farmer_5. So like any other company farms are with subsidies and payments from the EU. There are some part of our state there but there is so little of it. And the payments are declining every year.</p> <p>Conventional Farmer_6. I am not complaining. But I am not sure what the future holds.</p> <p>Conventional Farmer_7. Of course. One thing is that in Lithuania payments are smaller than in the west of Europe. The second thing in my opinion is benefits are paid to those people who should not get them.</p> <p><...> The development [of organic farming sector] was completely halted by the recent rural development programme because they simply did not take in new organic farms. They simply did not pay additional payments to the newcomers who wanted to register their organic farm after 2015. So I think this is one of the reason why the development stopped – lack of financial support.</p> <p>Organic Farmer_1. I am not very sure what I would do. But the future actions would be definitely decided regarding the economic benefits. <...> The market of organic meat in Lithuania is very small. Well I mean final consumers. <...> The owners of slaughterhouses estimate that only 5,000 cattle a year is needed with the current consumption habits in Lithuania. But there are 50,000 cattle in Lithuania. Because again the production is very high quality (INNAUDIBLE) who goes straight to the steakhouse and the other 95%, or 90% will have to go to "Utena meat", and those will not pay the premium. In this sense without the organic payments it would be thought and you would consider few times if it is worth doing all this [continue organic farming].</p> <p><...> As more and more new farms emerge, the number of hectares increases, and then the total payment for one hectare decreases. And 2015 was that turning point when those payments encouraged many farms to switch and become certified. Especially those large farms that distorted the so-called "basket" and then there was not enough money. Well, our ministry in this case and did not know what to do, because, of course, they received a lot of complains form old market players that the subsidy was X size and now it is clearly smaller, but on the other hand, well, it's all legal. If you announced that there is such thing, then whoever wanted to - participated. So the government panicked and made a decision that from 2015 those who start [organic farming] will not receive direct payments.</p> <p>Organic Farmer_3. This would greatly affect our farming. We are already thinking about moving towards conventional farming this year.</p> <p>Organic Farmer_4. We would feel a little, but we would survive. Because we are already moving away from the national and European market, because we have our customers who trust us and if we raise prices, they will still pay.</p> <p>Organic Farmer_5. It will be quite hard. But I think it would be okay.</p> <p>Organic Farmer_6. I personally don't get anything anymore because we made a mistake in the paper. We get the basic payments. Like ordinary farmers. I don't know how will happen at this point at this point but we don't get it.</p> <p>Organic Farmer_7. If not for additional payments I guess we would just decrease the production and count what is cost-efficient... maybe even stop the organic production.</p>
<p>Step 4: Development of non-competitive relationships</p>	<p>8. What would you do if the government suddenly lowered the financial support for the organic farmers and got rid of subsidies? (Q ONLY FOR <u>ORGANIC FARMERS</u>)</p> <p>10. How do you feel about the current regulations and relationship between farming community and the government?</p>	<p>Organic Farmer_1. I would say that from an environmental perspective, or organic farming rules well... I don't see any particularly big problems there. <...> Our government in Lithuania, in general, is "trying to catch up" or to adapt to something. That example with the increase in the number of organic farms. Rules were created to encourage the growth [of organic farming]. Then it started growing, then government realized that the situation is distorted, then started running after farmers, forbidding growth like "don't do it anymore."</p> <p>Organic Farmer_2. I think the rules are a bit too harsh. Not necessarily for organic farmers but also for general farming community. It is just sometimes nonsense. These Lithuanian rules and laws conflict with EU rules sometimes and it is very difficult.</p> <p>Organic farmer_3. In Lithuania? Very bad. I think this is an unfair market. I understand that some people are angry, that some of us getting more support and so on and so forth. But I support a free market economy. I agree we are one economic area in Europe. So then we all should support our countries the same way – we give the same treatment for everyone. <...> Most countries and most businesses support their farmers, and they buy from their farmers at a fair price and they do not import from other countries much. <...> Lithuania does not support us in the same way. Majority of the products leave the country. <...> There is no relationship between us and the government. Nowadays, organic farms look like villains to many. They say there is no ecology, that we live way too well. Whoever, says that have never seen how nature works.</p> <p>Organic farmer_4. We are already accustomed to all that bureaucracy seems. But the biggest problem is that a lot of paperwork is needed which is not even necessary. <...> I don't know. I didn't really thought about it.</p> <p>Organic Farmer_5. <...> There is that excess of requirements and everything is already strict, and sometimes everything depends on the inspector. For example, there's a mathematical mistake, let's say you rewrite kilograms from one year to the next, but there's a zero example (INNAUDIBLE) that usually gets you a sanction warning and something else. It's just like that <...> maybe for younger generation it is easier. We do everything with computers, things are different for us, but for the older generation. It's too much requirements like that. <...> We now live in a state of obscurity. It is such a bureaucratic thing. Until we start don't start declaring, we don't know what will happen or what we won't get.</p> <p>Organic Farmer_6. I believe some of the regulations should be stricter. Especially the environmental regulations. <...> However, the document side of farming should be more lax. The farmer should not spend as much time on documents as he already has somewhere else to spend that time.</p>

		<p>Organic Farmer_7. I think everything is okay. I never looked into other countries too much but other countries do have it all much easier when it comes to regulations. <...> the relationship is like everywhere else. But sometimes it is quite conflicting with them because they don't know what they want.</p> <p>Conventional farmer_1. There is a very different position of different politicians on the adoption of certain laws. An example would be manure storage which was allowed to have it in any way. Now, we should, like everyone else, set up manure storage. No transition, nothing, and the investment is really big. And again - our farm is in a town. If we install a manure in the settlement we become the biggest enemies of our neighbours. And in the middle of the fields to make a big enough building is... well it is not a very adequate approach. And then you become a hostage of a system - I don't know when I will become completely unsuitable for farming according to lawful definitions. <...> But requirements for organic farms are stricter. But everything else is basically the same laws in the sense that we all have to ensure animal welfare. Again, growing crops in the same sense under the law, I don't even know where to find the differences apart from the fact that you take on the obligation to grow organically.</p> <p>Conventional Farmer_2. In fact, I never cared enough to check regulations for organic farms. I know that there was a lack of financial support for area payments. And about conventional ones? I don't complain about it. Maybe there are still too many documentation there. <...> Small things like that. About market... well... Whatever we grow - about 70% is exported, especially wheat, rapeseed and it is very little processed in Lithuania. National market is very weak in Lithuania. Dairy farming is shrinking, there are no dairy cooperatives, or that farmers are not encouraged to produce the products themselves. This thing is bad.</p> <p>Conventional Farmer_3. I have a lot more to do with the veterinary rules. Namely milk processing. <...> Farmers like me are heavily regulated.</p> <p>Conventional Farmer_4. For smaller farms the taxes and in general regulations are quite brutal. <...> Potentially, seeing all the regulations small farms will disappear in the future. <...> As for small organic farms: Basically I know one who does half and half and he wants to go back to completely conventional. Another one is already retired. And he says that "it is enough for me and I am renting out my land and there will definitely be no organically farmed lands there." Maybe what 2015 breaking point influenced this a lot... Also there is another local organic farmer - he is also planning to switch to conventional farm. <...> The giant farms are the ones who dictate the rules. So they [the government] are automatically looking at them without any consideration <...> and do not look into the small farms.</p> <p>Conventional Farmer_5. The further we go, the more complicated they [the regulations] become. Just today I read an article that a 60-year-old is retiring from farming because he is 67 years old and he no longer understands those bureaucratic aspects.</p> <p>Conventional Farmer_6. Sure, there are a lot of those requirements out there and a lot of other requirements... And for now it is okay. But nobody knows how it will be different again.</p> <p>Conventional Farmer_7. I think on certain aspects the regulations should be harsher. For example, especially when it comes to the so-called "sofa farmers".</p>
<p>Step 5: Establishment of organic food market</p>	<p>3. When did you get officially certified? Was it hard to get certified? (Q ONLY FOR <u>ORGANIC FARMERS</u>)</p> <p>4. What are the ways you are engaging with your customers?</p>	<p>Organic Farmer_1. Practically it wasn't that hard. Maybe at the very beginning. <...> That administrative process raises most questions because new forms are needed for certification all the time. Well, you know in Lithuania... sometimes the person who inspects your farm collects the information. He evaluates in one way. When he later passes it on to some specialist, then he/she evaluates it differently sometimes. So in that sense administrative things were more problematic than practical or how to do it technologically.</p> <p>Organic Farmer_2. Certification is not a difficult thing. But when for example you want to have organic produce... Let's say I wanted to make my beef organic. In that sense, certification is as follows: 3 years you are in transition, then I went to the hell and back to collect all kinds of permits orders, claims of neighbours that the fields were never sprayed and so on and so forth. But I collected everything. Anyway, in terms of paperwork, it's not hard. <...> You fill everything in and it is easy.</p> <p>Organic Farmer_3. Everything is quite simple. You get your seminars, fill in documents. You give all the information, they come and they check your farm and that is it. Quite simple.</p> <p>Organic Farmer_4. The very beginning of building a farm was not yet very known to me. <...> My parents helped me with everything. And then you learn as you go.</p> <p>Organic Farmer_5. Most problematic was that uncertainty. We didn't know much. I didn't know accounting and those requirements might have been a bit tedious, but those primary inspectors were great and understanding.</p> <p>Organic Farmer_6. It is not hard. You just need to write a request to Ekoagros. And then they come and check. And the fee now... At first there was no fee. Now it is increasing little by little. But basically not hard. Of course you need to know those norms, rules but it is not hard.</p> <p>Organic Farmer_7. It is not complicated because I knew it from before. All you need to do is get your documents right and that is it.</p> <p>Organic farmer_2. Hard to describe. One day long time ago I butchered my ox because he broke his leg and I needed to put him down. <...> but then I was told that I am not supposed to sell it to anyone directly because that is illegal. <...> I am selling it to a company which one day in a week takes in organic cattle and they pay me.</p> <p>Organic Farmer_3. We only sell in large quantities. Buyers of our product are resellers only. In Lithuania, organic production is not really needed and has a very huge surplus. And since prices in Lithuania are low compared to the whole of the European Union, most of the production travels to Europe.</p> <p>Organic Farmer_4. We have a webpage so we sell a lot there. It's all on the internet basically, and few eco-shops that sell it, but now there were different options. First, all grain went to Europe. But later we started a mill about 6 years ago and then we started selling directly to the local consumers.</p>

		<p>Organic Farmer_5. Exhibitions. The vast majority of them comes via exhibitions. We tried making juices, selling it. But bigger cities like Vilnius, Kaunas, and Klaipeda are too far for us. And locals don't need it. They need cheap and good quality. That is simply not possible for us.</p> <p>Organic Farmer_6. Until there was no quarantine I went a lot to participate in fairs and markets. In collaboration with the Ministry of Agriculture, I am involved in the cycle of the seminars where I talk about my farm.</p> <p>Organic Farmer_7. We sell directly to the customers in farmer markets. Sometimes we supply for the supermarkets but very rarely. Some kindergartens..</p> <p>Conventional Farmer_1. We do not sell directly to the customers. Most of the products are sold to the large buyers, well, whoever pays a better price or who is more convenient to deliver.</p> <p>Conventional Farmer_2. We belong to a cooperative, and almost 100% is sold via the cooperative. Well maybe 95% percent via cooperative, and the rest to individuals for seeds</p> <p>Conventional Farmer_3. Simple. We make everything and transport it to the city. I put out an advertisement and get the orders. Nowadays I also already give them to the stores.</p> <p>Conventional Farmer_4. We actually just sell directly - the port. Better price at the moment.</p> <p>Conventional Farmer_5. When the farm is not small, then buyers just maybe contact themselves. Or another option: when you the best price, then call to the companies and ask what price would they offer.</p> <p>Conventional Farmer_6. We mostly sell to the big companies and don't really engage with private customers.</p> <p>Conventional Farmer_7. It really depends. But we mostly sell to the big companies and sometimes we sell the seeds.</p>
	<p>5. Do you think the official certification/logo helped somehow to increase sales of your production? (Q ONLY FOR ORGANIC FARMERS)</p>	<p>Organic Farmer_1. I am not actually using it. Well, certification and logos largely benefit those farms that produce the final product directly to the consumer. It is then logical to have that logo. Because the biggest plus for organic production is paid by the consumer. But in our case, only 5% or 10% is sold directly to the consumer. Other products are passed on to the processing companies. In that case, that certification is useful. But the main benefit is subsidization.</p> <p>Organic Farmer_2. It is very hard to say. I have a very different situation. <...> Because I tried to get the label that my products are organic. But they said very clearly - because the slaughterhouse you bring your beef is not organically certified your beef it is no longer organic. I also explained to the veterinary agency... I said - I want to trade legally. This would be my production, I want a label. They said - you have no premises to do so. I say - what kind of premises can it be. I slaughter at the slaughterhouse. Meat vacuumed from a slaughterhouse directly goes to the consumer. All I need is a label on the package. They said - well, you can't. You can't do that with beef.</p> <p>Organic Farmer_3. I would say that the logo has no influence whatsoever.</p> <p>Organic Farmer_4. The logo itself is not even needed for small farmers, because they sells to acquaintances or regulars who already know them. Then less paperwork and if you don't get organic benefits, then that badge is unnecessary. I certified the mill myself just a few months ago. For years it has been like that my grains come in the mill the organic logo falls off and the packaging comes out without the logo. But I didn't need that logo, I sold successfully anyway but we came up with the idea that we need educational activities in kindergartens and schools. And that's because we mark our production we are able to reach kindergartens and schools.</p> <p>Organic Farmer_6. No I do not think so. We always have our own customers who buy our products and they know the quality that they are buying.</p> <p>Organic Farmer_7. I am not using the logo. But I think if not for certification we would not be so interesting for the customers. So I think in that aspect It helps.</p>
	<p>6. Do you feel like there is enough recognition? (Q ONLY FOR ORGANIC FARMERS)</p>	<p>Organic Farmer_1. I think public opinion is very positive and there is no distrust in that organic logo or anything like that. There is no such thing. The public sees this as a sign of quality. Maybe there is some confusion in those "in-between" categories where there are products of the so-called "exceptional quality" in Lithuania. This then raises question of what is organic and are these kind of products organic? Well no they are not organic. Organic products still have that international recognition and everyone has heard more and less about it and knows what it is.</p> <p>Organic Farmer_2. I used to sell vegetables. But where I was selling in ___ people did not value organic products. But I feel like for beef, especially for younger generation, and parents it is important.</p> <p>Organic Farmer_3. I don't even know if I would say the government helps to promote organic farming. Definitely not the Lithuanian government. Because the government goes categorically against organic farms in a biased manner when it comes to laws and regulations. That trend is visible to the naked eye, given what the commitments are and how difficult things are for the organic farms. Do any other companies help I would say no one helps either. And if you order something, what kind of advertising companies, well, they do their job on their own.</p> <p>Organic Farmer_4. No doubt. I can't keep up with the demand, and the number of buyers is growing and I don't plan to expand. Therefore, I support those who are switching to organic farming. But there are not many of them.</p> <p>Organic Farmer_5. Of course it is not enough. There is complete lack of education. We should probably start from that place that I would think that education should probably start from kindergarten, from school. I'm glad our local kindergarten is educating my kids about how they know what ecology is, what is a healthy product, what is unhealthy... But the current generation... They don't see the difference.</p>

		<p>Organic Farmer_6. One of the things In Lithuania is that advertising of the different products. And people cannot really say the difference between the “exceptional quality” product and the organic product. But they are very different.</p> <p>Organic Farmer_7. I don’t know. Maybe. We have our own customer base so we don’t really see it. Maybe.</p>
<p>Step 6: Development of a committed institutional setting</p>	<p>9. How do you feel about education and awareness incentives where the consumers are told of the benefits of the organic product and organic farming? (Q ONLY FOR <u>ORGANIC FARMERS</u>)</p> <p>11. What do you think of the current goals and action plan for farming?</p>	<p>Organic Farmer_1. Well, I see that generally those ads and education that we have right now are really not enough because still most of the advertising is not directed at it [organic product] because there is only a small part of the society that actually buys it.</p> <p>Organic Farmer_2. There is enough of advertising and promotion. Everyone is promoting it, everyone is talking about it, the need to buy first hand from farmers and so on. Everyone is encouraging me to put adds that I sell organic meat. I did. I did it more than once. And sausages and raw meat - no one needs it. Vilnius [capital of Lithuania] earns a lot. They may be able to take advantage of that. <...> But where I live – people don’t value organic products that much. Let’s say “Maxima” [the largest grocery chain in Lithuania]. They have that “organic corner” where there is refrigerator for organic meat and everything organic - you will rarely see any customer there.</p> <p>Organic Farmer_3. People who want to find organic products they can find it themselves. But even then, as I say, is a double-edged sword. People who want to find them are usually richer people because our product is more expensive <...> In general it is very difficult to enter that market. All of this makes it very difficult to reach consumers.</p> <p>Organic Farmer_4. Whoever wants to find it [information on organic products] – they will find it. But there are people who we cannot change and I don’t want to change their attitudes or opinions. We need to focus on the young generation. <...> I can congratulate the Ministry of Agriculture, which now takes care of organic products for kindergartens and schools. This is a good step forward. <...> But the Ministry of Education and Ministry of Health, I think, should also contribute. Children belong to the Ministry of Education as well as Ministry of Health because <...> They should invest in education and promotion of organic farming. But when such conferences or seminars take place, it is not even possible to invite them.</p> <p>Organic Farmer_5. It all starts with a lack of education, both for older and young people. For the older ones... well that is it – the “train” has left. But I think we should educate young generation about what an organic product is. Of course, let’s say how our district is here. Most of us here still manage to grow up at home. There is no big city nearby where we could have a big market somehow. When we were going to Vilnius, Kaunas - we loaded our production and we come back at noon, sold everything. However, it takes us three hours to get to Vilnius alone, it is just too far away and the main market is there and I am not saying that there is no market in Lithuania, but as much as we have we are not able to take Vilnius, it is easier to sell it to Germany.</p> <p>Organic farmer_6. Earlier days there was a norm to talk about it. Now no one is talking about it. Well, we talk, but we don’t teach. But this should really be included from kindergarten. Children need to be taught what to eat in order to be healthy.</p> <p>Organic Farmer_7. I think the promotion is way too less. Especially in Lithuania. People don’t really trust the certificates. Not always.</p> <p>Organic Farmer_1. What I really dislike so far is the frequency of regulatory change. There is so many questions for the future like what is better or worse? We actually have some kind of change every year or every 2 years. So this is very annoying and it makes everything very unclear.</p> <p>Organic Farming_2. Lithuania has no plan whatsoever. And not just for farming but also for encouraging and developing organic farming. They [the government] are always like “let’s do it that way and then let’s see how it goes.” This is always so surprising for me.</p> <p>Organic Farmer_3. There are some institutions who are interested to help you. But Lithuania changes regulations whenever they want. <...> In order for them to plan for the future, as they say, they should firstly write something down. To this date, there are no plans, no structures, what will be the benefits, what is most worthwhile to do and where the direction is going. Lithuania, has greatly reduced all ecological payments. Very little is left.</p> <p>Organic Farmer_4. I think every government has some plans, but they don’t manage to warm up and gain the momentum. And then again the government changes and their plans are quite different. It seems like a chaos and there’s no plan.</p> <p>Organic Farmer_5. We expect that even somehow someone will have a plan towards where we are moving. We don’t have it. Just one government comes - makes a promise... Another one decides that maybe it was wrong and we are them, like I say, thrown here and there and we no longer understand anything anymore.</p> <p>Organic Farmer_6. There are no exact guidelines. It’s just “greening” out there. Is there a clear path towards that greener farming? What exactly is it? It is not explained clearly. Minimise fertilisers, minimise something else... Yet again there is no strategy</p> <p>Organic Farmer_7. There is no plan! The competitions for example are only for the cattle owners. Other cannot compete against them. <...> There are no priorities.</p> <p>Conventional Farmer_1. The dialogue, in general, is not good. And in general it would be just nice to know that that there is a certain continuity and let us know that until 2025 the taxes will be the same and they will not change. Let’s say we get one rule now and we will all reconsider it after the certain period. And now new politicians come, they maybe slept badly, and tomorrow there will be change in the regulation.</p> <p>Conventional Farmer_2. No strategy, no vision, no goal whatsoever. Someone says something a little bit on what that agriculture should be. Or a village supposed to be like. <...> But with agriculture this is absolutely not the case. It is like where the wind blows we turn there. In Lithuania to this day it is still not known, it is not defined what is that family farm, what is small, what is medium, big... We don’t know anything.</p> <p>Conventional Farmer_4. The big farms dictate everything so whatever they say – it will be done by the state.</p>

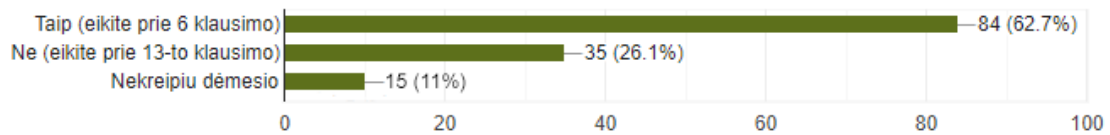
		<p>Conventional Farmer_5. Stability is very needed. We need a clear vision of what we want to achieve and a clear plan and then we go for it. 4 years pass - everyone comes with their own thoughts, with their own desires and with their own visions. After the election, things are changing again. But if we had some kind of long-term plan between the election terms, all would be well. But now no one understands where we are going. <...> There is no plan. Let's say we reduce those pesticides - let's reduce them. Fertiliser reduction - let's do it! <...> But nothing is planned. What they can do is tell us what the plan is but again we are part of the EU and it is not in our power and the government can only partially decide what will happen. And who will descend from there - we do not know again. Yes - there is no plan.</p> <p>Conventional Farmer_6. Every 4 years the government changes. And there is a saying: a new broom sweeps differently... New power comes - again things change.</p> <p>Conventional Farmer_7. There is no goal and no plan. <...> It was that 2014-2020 plan which was one-sided. Now we are already focusing on something completely different. <...> We need some kind of guidelines. And not that for 5 years one government said something. Now a new government is saying like "now we will ban diesel for you." Well... all right. Everything changes, that's ok. But there must be some preparation for that. You simply cannot do that.</p>
	<p>12. What do you think could be done better?</p>	<p>Organic Farmer_1. It would be great not to support every single farmer. What I mean is at the moment subsidies and payments make are provided to whomever. I mean, it does not matter if a person is doing it [farming] right or wrong. Sometimes farmers do not know if their locations is naturally suitable to carry out certain production. So the farmer does whatever seems right to him. <...> I think that maybe there is more room for some change in the activities of the Food Veterinary Service. They should ease out the regulations a little bit for some local farmers... I don't know. Just to help them to promote their production. The regulation of trade rules cannot be discriminatory.</p> <p>Organic Farmer_2. Good question. Does the state do anything at all? I doubt it. Because we get the lowest benefits and payments compared to the other EU countries. And those fuel allowances are also ridiculous.</p> <p>Organic Farmer_3. Oh it is a long list. One big minus is that a farmer cannot sell his produce directly to a customer. That should be changed <...> Another very bad aspect for an organic farm is that it doesn't allow you to participate in multiple programs at once.</p> <p>Organic Farmer_5. There is so much you need to do when it comes to the documents and report writing. I think that should be lessened a lot. Just that filling out reports and balance sheets. All those stuff. Let's say a farmer wants to write a project. An older person has to hire a professional because there are excessive requirements for an ordinary person.</p> <p>Organic Farmer_7. I don't know. I think they should lax some restrictions. They are trying to catch those "sofa farmers" but then in some instances we suffer who are actually working. They should put restrictions but adhere to the other farmers and be very smart about the regulations. <...> It is hard to make those criteria but I understand that it is possible.</p> <p>Conventional Farmer_1. Simple. They [government] should just decide which way they want to go and do not run around to different directions every day.</p> <p>Conventional Farmer_2. This topic is discussed a lot with farmers. It is the worst thing in Lithuania. There is no strategy. Something quickly is done... This Chamber of Agriculture doing something little, then the ministry... But then Seimas changes and then nonsense happens and all those political things... Huge nonsense.</p> <p>Conventional Farmer_3. I think the state regulates our veterinary and their rules. They should be made simpler. Because when I compare it with other EU countries... Well, everything is simpler there.</p> <p>Conventional Farmer_4. I think the whole tax system should change. <...> Everything is as the state wants it. If they want big farms they will lower taxes for those big farms. Want small - will make everything for small. It is controlled by the state. Nowadays everything is concentrated towards growing big farms.</p> <p>Conventional Farmer_5. They [the government] should just stop backstabbing us. And could have less regulatory aspects a little. <...> Also just like the whole public sector should cut the bureaucracy apparatus altogether. Because still that bureaucracy... Let's take some big company - they have their own lawyers, accountants and so on. The farmer is alone and he is supposed to figure out all the nuances of what is going on around. It becomes difficult.</p> <p>Conventional Farmer_6. Actually I cannot complain at the moment.</p>

Appendix C Survey for the consumers of Lithuania

The data is taken from the devised consumer survey (in Lithuanian). Irrelevant answers that were not used in the thesis are excluded from this appendix.

3. Ar perkate ekologiškus (sertifikuotus) maisto produktus?

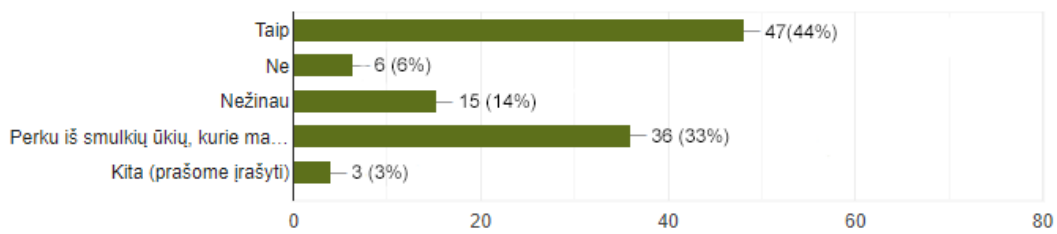
134 responses



6. Ar perkate oficialiai sertifikuotus (ženkliais pažymėtus) ekologiškus maisto produktus?

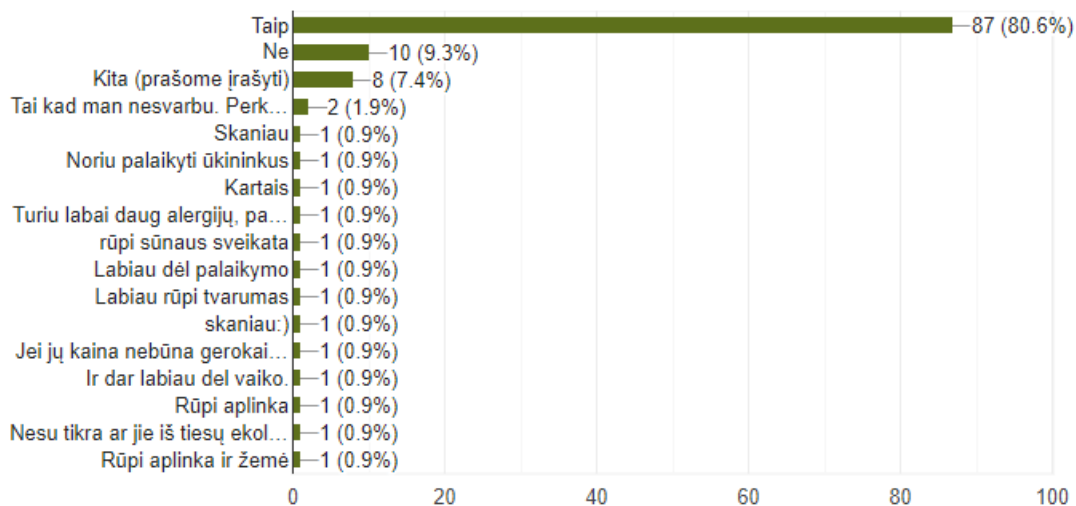
(Galite pasirinkti kelis variantus)

107 responses



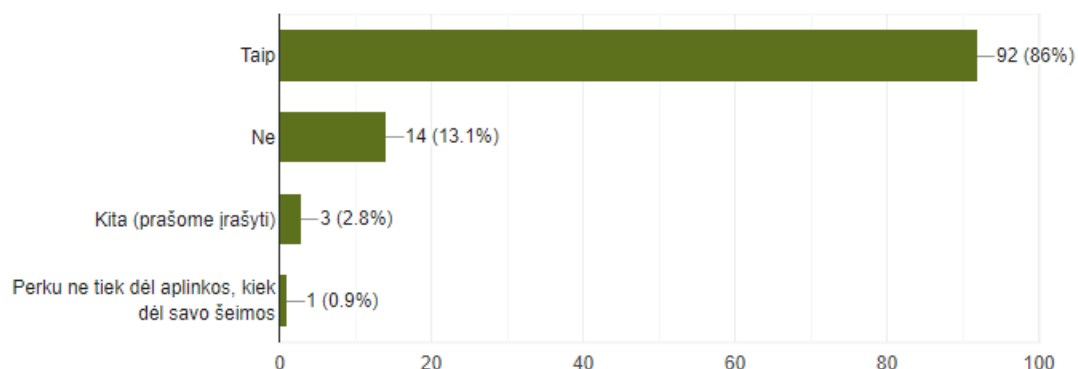
7. Perku ekologiškus produktus nes man rūpi mano sveikata.

108 responses



8. Perku ekologiškus produktus nes man rūpi aplinka

107 responses



9. Trumpai apibūdinkite, kas, Jūsų nuomone, yra ekologiškas ūkis.

134 responses

Nėra chemijos visokios. Trąšos normaliai pilamos.

maistas be chemijos

Kur yra nenaudojama chemija

Be trąšų

Ūkis, kuris naudoja mažiau trąšų, yra toliau nuo gatvės

Auginantis be įvairių pašarų, dirbtinių trąšų, ir t.t.

Nenaudoja piktų trąšų ir visokių ploviklių

Ekologiskas ūkis, kuris nenaudoja visokių keiskingu trąšų ir pan

Ūkis, kuris nenaudoja jokių dirbtinių, neorganinių chemikalų, trąšų (uginant produkciją).

Nenaudojami chemikalai , auginama svarioj aplinkoj(ne prie gatves)
Sertifikuoti pačių užaugintų ūkininkų, arba iš žmonių kurie patys augina ir parduoda turguje arba kaime iš pažystamų
Be chemijos
Tai ūkis, kuris vykdydamas savo veiklą atsakingai naudojasi trąšomis, tausoja aplinką, kurioje vykdo savo ūkinę veiklą
Produktai užauginti be trąšų ir chemijos.
Be jokių priedų, užauginta natūraliai
Ūkis nenaudojantis cheminių trąšų
galbūt tas, kuriame nenaudojama arba minimaliai naudojamos trąšos, chemikalai. Jis toli nuo kelių, gamyklų, šalia nėra užterštų vandens telkinių ir pan.
Be fungicidų, herbicidų, pesticidų, glifosato ir t.t.
Sertifikuotas. Gyvūliai laikomi, taikant specialias sąlygas, vaisiai/ daržovės - nenaudojant kenksmingų cheminių medžiagų.
Tai toks ūkis, kuriame auginami produktai pasitelkiant ekologiskas priemones (pašarai, trąšos ir pan.) bei atsižvelgiant į gamybos bei produktų pakavimo būdų tvarumą.
be chemijos visokiausios turbut
natūralūs produktai, nekenkia aplinkai
Nenaudojami pesticidai, skonio stiprikliai, nenatūralios trąšos ir pan
Ekologiškas ūkis, tai ūkis, kuriame auginami produktai yra užauginami be pridėtinių kenksmingų medžiagų, jei tai augalija- be pesticidų, jei gyvūnija- be kenksmingo pašaro. Ir išmatos (jei gyvūnija) ir likusios nepanaudotos augalijos dalys(?) būtų panaudojamos kaip pašaras arba kompostuoti, o išmatos, kaip mėšlas. Tiesiog, kad viskas būtų tausojama.
Natūralumas
Nenaudojamos sintetinės trąšos, gerai elgiamasi su gyvūnais ir rūpinamasi jų gerove
Ūkis nenaudojantis cheminių trąšų bei neapdorojantis produktų cheminėmis medžiagomis
ekologiškas ūkis
Be sintetinių trąšų užaugintas derlius
tausojantis gamtą ūkininkavimas ir natūrali produkcija
Net nežinau. ten kur neaugina ant chemijos visokios
Ūkis, kuris gyvena kitais principais nei darbo ūkiai (Karbausio)
Užaugintas sveikai, nekelia pavojaus aplinkai bei sveikatai.

Tai ko nera Lietuvoje

Ekologiškas ūkis, mano nuomone, yra tas ūkis, kuris augina neužterštoje dirvoje, be kenksmingų trąšų, maitina gyvulius kokybišku pašaru ir t.t.

Savo užaugintas derlius, be visu trąšų.

Ūkis auginantis produkciją aplinkai ir žmogui nekenksmingais būdais-t.y. nenaudojant kenksmingų trąšų ir kt.kenksmingų derliaus gerinimo priemonių.

Kuriame nenaudojami pesticidai, didesnė teritorija skirta vienam gyvūnui.

Kai viskas yra natūraliai be jokių papildų

Manau tas, kuris aginimo procese nenaudoja chemikalų

augina be chemijos

Ūkis turintis sertifikatą ir atitinkantis tam tikrus žemės dirbimo ir augalų auginimo reikalavimus

Tai nemodifikuoti produktai

daržoves vaisia ir t.t nepaveikti cheminiu medžiagu

daržovės, vaisiai, natūraliai gamintas ir gautas produktaas, kuris nebuvo gautas kenkiant ekosistemai

visiškai draudžiama naudoti genetiškai modifikuotus organizmus;

Ekologiškas ūkis, tai kuomet produkcijos auginime nenaudojamos augimą skatinančios ar nuo piktžolių ginančios cheminės medžiagos

Chemines medžiagas ribojantis, dirvožemį tausojantis ne monokultūrinis ūkis

išauginti produktai palankioje aplinkoje be pesticidų

Produkcija užauginta nenaudojant cheminiu pagrindu sukurtų trąšų, pesticidų ar kitų augti padedančių priemonių. Taip pat tai produkcija be GMO.

Švariai ir be jokių genijų išaugintas produkcija

.

Ūkis, kuriame produktai auginami natūraliai, be dirbtinių trąšų ar chemikalų. Tai ppat ūkis nutolęs atitinkamą atstumą nuo kelio.

nenaudojantis chemijos, trąšų, pesticidų; pakuoja ne į plastikinius maišus ir pan

Ekologiškas ūkis toks, kuris auginamai kultūrai nenaudoja cheminių trąšų ar pesticidų.

Kur naudojama tik natūralios trąšos ir ūkis randasi toli nuo gamtos taršos objektų.

užauginta be trąšų

produktai be jokių chemijų

Kur nėra GMO, hibridų, pesticidų

Kur augina be chemijos pvz daržoves, laisvai bėgioja vištos

uzaugunta, tausojant gamta, naudijan maziau trasu.

ūkis, kuriame naudojama mažiau trąšų ir kitų priedų, kurie didina derlių ar patį produktą. F

Sertifikuotas, nenaudojami pesticidai, herbicidai, cheminės trąšos

Kai auginamai natūraliai be jokių trąšu

ūkis, kuris atitinka patvirtintus ekologinio ūkio reikalavimus

Nenaugojantis trąšų, tvarus, prdoukcija nedideliais kiekiais, bet dėl to brangesnė

produktai be jokių chemijų

Kur nėra GMO, hibridų, pesticidų

Kur augina be chemijos pvz daržoves, laisvai bėgioja vištos

uzaugunta, tausojant gamta, naudijan maziau trasu.

ūkis, kuriame naudojama mažiau trąšų ir kitų priedų, kurie didina derlių ar patį produktą. F

Sertifikuotas, nenaudojami pesticidai, herbicidai, cheminės trąšos

Kai auginamai natūraliai be jokių trąšu

ūkis, kuris atitinka patvirtintus ekologinio ūkio reikalavimus

Nenaugojantis trąšų, tvarus, prdoukcija nedideliais kiekiais, bet dėl to brangesnė

Naudojama tik natūralios trąšos, be chemikalų

kuris neteršia gamtos.

Pagrindinis ekologinio ūkininkavimo tikslas – kuo mažiau pakenkti gamtai.

Tas kuris gerai rūpinasi gyvūnais kurie auginami tenai arba jeigu tai augalai/maistas, tai kad trečiami būtų nekensmingais chemikalais. Visiem žmonės kurie dirba tokiuose ūkiuose būtų mokamas bent jau minimumas ir suteikiamas sveikatos draudimas, suteikiamos geros darbo sąlygos kurios nėra pavojingos jų sveikatai ar gyvybei, darbo valandos nėra labai ilgos arba darbo sąlygos nėra per sunkios ar labai alinančios. Taip pat ūkis rūpinasi žeme ir aplinka, nekenkia gamtai aplinkui, naudoja augalines trąšas ar pašarą, apskaičiuoja ir naudoja mažiau vandens ir pnš.

Švarios s žemes ūkininkavimui ir auginimui, neapdirbamos kenksmingom trąšom ir kt.

tvarus ukis, kuo maziau atlieku, kuo amziau trashu

Sertifikuotas ukis, turintis ekoligiams produktams keliamus reikalavimus. Nenaudojami antibiotikai , pesticidai. tausolama gamta.

Sertifikuotas ūkis, turintis ekologiams produktams keliamus reikalavimus. Nenaudojami antibiotikai , pesticidai, tausojama gamta.

Ūkis, siekiantis kuo mažiau teršti aplinką, naudoti natūralias, gamtoje randamas, priemones ir išsaugoti įvairovę.

Ekologiškas ūkis tai ūkis kur viskas auginama natūraliai, be cheminių medžiagų. Gyvūnai gyvena geromis gyvenimo sąlygomis

Man pakaktų ir maksimaliai natūraliai auga užaugintų maisto produktų.

Nenaudojantis ypač stiprių chemikalų veikloje.

Tvarus ūkininkavimas, kurio metu nenaudojama jokia chemija ir pasikliaujama natūraliu procesu.

Ūkis, kuriame pradėdant žeme ir baigiant pašarais , kuriais šeriami gyvuliai yra neužteršta chemija, pvz. "roundapu", kancerogeninė medžiaga., nenaudoja antibiotikų, leidžia gyvuliams ir paukščiams laisvai vaikščioti.

Maistas užaugintas be jokių pridėtinių priedų

Sveikai užaugintas

Kuo mažiau trasa

Ūkis, kuris nenaudoja pesticidų ir cheminių trąšų.

naudojantis labai ribotą kiekį pesticidų

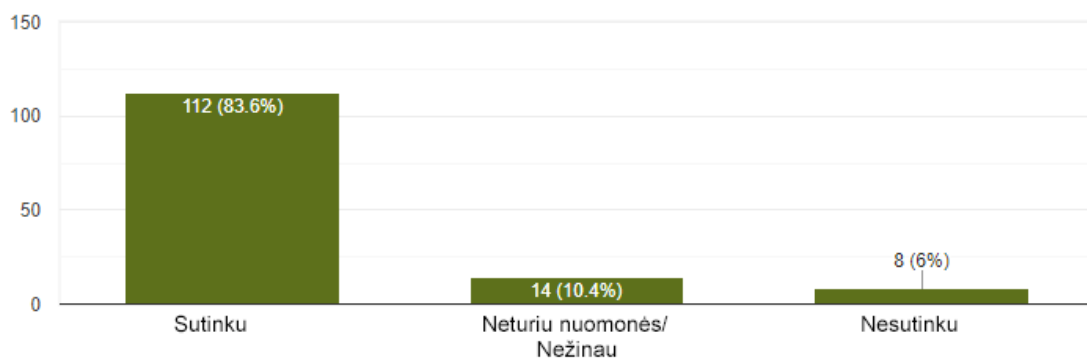
Kur viskas auginama natūraliai be pesticidų, be cheminių trąšų

Viskas auginama natūraliai, nenaudojant chemijos.

Kažkas kas užauginta be jokių chemikalų

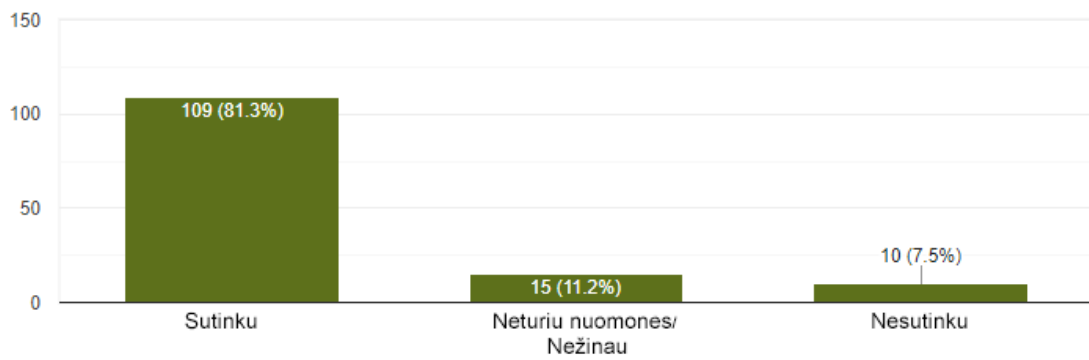
10. Pirkčiau daugiau ekologiškų maisto prekių jei jos būtų pigesnės.

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25. Manau, kad valstybė/televizija/parduotuvės ir t.t. turėtų daug aktyviau šviesti žmones apie ekologinį maistą ir produkciją.

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Appendix D Six Step Theory. Original table taken from Larsson et al. (2013, p.6, 7)

I used the table of the Six Step Theory devised by the Larsson et al. (2013, p.6,7) since he worked closely with the theory of Michelsen et al. (2001). However, I decided not to put some of the characteristics and indicators that were used in the original table since many of it were repeated in order to show their relevance and interconnections within the table and in regard to the case studies (for example: Characteristics B) in the 2nd step, D) in the 4th step). Therefore, I decided not to repeat them as the results and discussion would simply show same findings. Some of the characteristics and indicators were also connected into one to make the results shorter but at the same time show the same finding.

The Six Step Theory of Institutional Development in regard to the organic farming in the EU countries (Larsson et al., 2013, p.6,7)

Indicators used to assess the characteristic	Indicators used to assess the characteristic
Step 1: Establishment of an organic community	
a) The organic community has a strong identity	1: Introduction of first standard (date) 2: Number of national producers' associations 4: Private standard can still be used
b) Producers' associations have the power to influence other parts of society	3: Power of producers' association 5: Proportion of organic farmers that are members of an association (%)
Step 2: Establishment of political recognition	
a) Regulatory support exists	6: Introduction of first national regulation (date) 7: Introduction of current regulation (date) 10: Introduction of area payment (date) 11: Area payment (euro/ha) 12: % of agri-environmental scheme devoted to organic farming 13: Total amount devoted to OF (millions of euro) 15: Loans available for improvement of organic farms 16: Lower taxes for organic farmers 17: Certification/inspection costs reimbursement 18: Research support (million euros/year) 20: Action plan for organic farming
b) Financial support is high	21: OF incorporation in strategic plan of government 22: Quantitative target for proportion cultivated organically (%)
c) Strategic support is high	
Step 3: Establishment of financial support	
a) Financial support has been introduced	10: Introduction of area payment (date) 11: Area payment (euro/ha)
b) Area payments are high enough to off-set the cost incurred by conversion and lower productivity	13: Total amount devoted to organic farming (millions of euro/year) 14: % uptake of area support 18: Research support (million euro/year)
c) Research program is well-funded and complete	19: Estimate % of agricultural research funding to organic farming 25: Range of research program
d) There are financial schemes to help organic farmers	15: Loans available for improvement of organic farms 16: Lower taxes for organic farmers 17: Certification/inspection costs reimbursement 18: Research support (million euro/year)
Step 4: Development of non-competitive relationships	
a) Partnership	8: Partnerships strength 23: Specific office in agricultural ministry

b) Integration of organic farming in state institutions	24: Degree of integration of OF in training establishments 26: Degree of integration of OF in advisory services
c) Discussion arena existence	9: Discussion arena existence
d) Strength of the organic community identity	1: Introduction of first standard (date) 2: Number of national producers' associations 4: Private standard can still be used
e) The power a producers' associations has	3: Power of producers' association 5: Proportion of organic farmers that are members of an association (%)
Step 5: Establishment of organic food market	
a) A complete supply chain exist	27: Number of certified processing facilities (2004) 28: Promotion by large retailers 29: Distribution of sales channels 34: Perception of the quality of certification and control system
b) Other structural conditions are favourable	31: Proportion of consumer that can correctly define organic farming (%)
c) The behaviour of the general consumers is favourable	32: Acceptable price premium by 50% of the population 33: % of the population that buy OP > once a week/>once a month/< once a month 30: Market share of organic products (%)
d) The market share of organic farming is large	
Step 6: Development of a committed institutional setting	
a) An inclusive discussion arena exists	9: Discussion arena existence
b) An inclusive coordination arena exist	20: Action plan for organic farming

Appendix E The three interrelationships between the three domains.

The original table taken from Michelsen et al. (2001, p.11). I adapted the table for relevance of the paper and the case study of Lithuania. Moreover, as it is identified that the relationship in Lithuania is most definitely “Pure competition” the author aimed to emphasise that particular relationship thus placing it in the middle of the table which can be visually easily compared with the other two remaining relationships.

Three main types of institutional interrelationship between organic farming and general agriculture institutions (Michelsen et al., 2001, p.11)

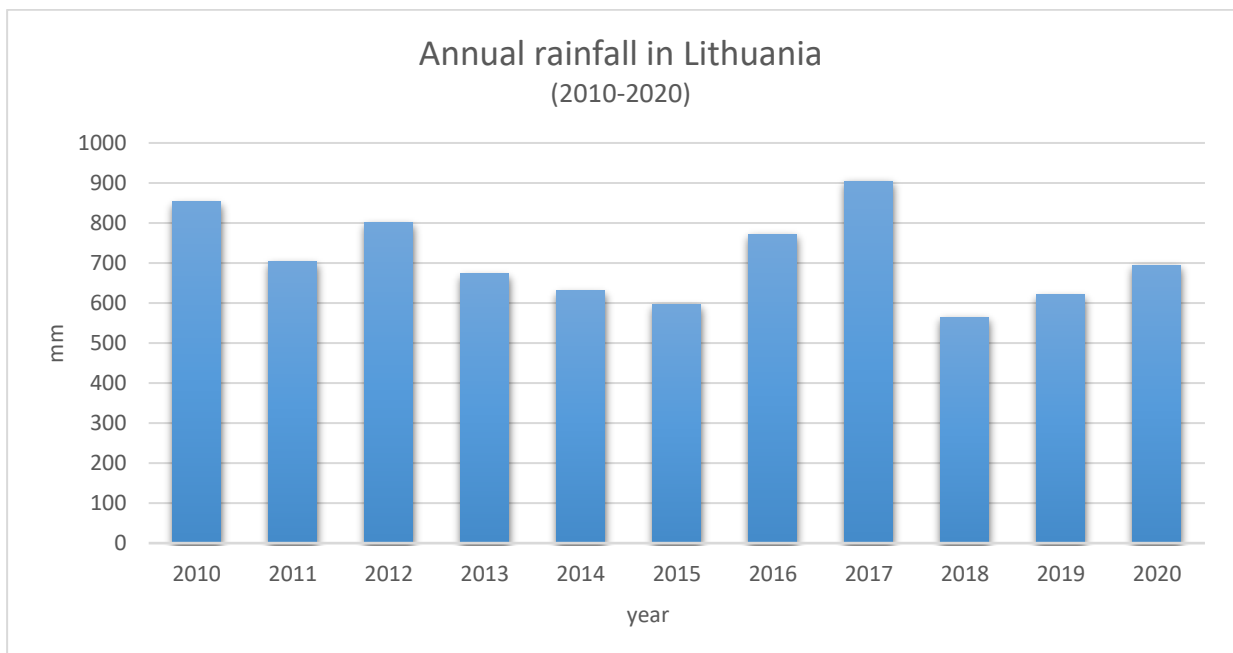
Characteristics	Pure cooperation	Creative conflict	Pure competition
Contact between organic and general agriculture institutions	Comprehensive and encompassing cooperation in all aspects	Co-operation in some aspects and competition in other aspects	No contact at all
Need of organic farming organisations	No	Yes	Yes
Perception of Interests	Silence on differences in farming systems	Joint perception of some interests – for instance regarding the environment – opposing perception on other aspects	Suppression of all interests and arguments of the adversary
Exchange of views	Differences toned Down	Competition and mutual respect for others’ views	No serious attempts for exchange
Expected consequences for organic farming identity	Wither away	Established but development on pragmatic basis	No change
Expected consequences for dissemination of organic farming	No continuous and substantial development of organic farming – unless perceived as future for all national agriculture	Organic farming develops stepwise based on creative solutions to issues of co-operation or competition	Organic farming development hampered

Appendix F Annual rainfall in Lithuania from 2010 to 2020 (raw data)

The following raw data was received from the Hydrometeorological Survey in Lithuania:

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Rainfall (mm)	852.8	702.9	801.4	672.9	630.5	596.3	771.3	904.4	564.07	620.9	694

The following table was created while adhering to the provided data. I decided not show the data until 2020 since it was not relevant for the study as all the other data in regard to eutrophication in Lithuania was only publicly available until 2018.



Appendix G Annual nitrogen and phosphorus inputs measured at the Nemunas outlet into the Curonian Lagoon (raw data)

The following raw data was taken from the HELCOM database and can be found on HELCOM (2019) (PLC-Water. Retrieved from: http://nest.su.se/helcom_plc/) as indicated in the reference list. The nutrient input ceiling for Nemunas RBD was indicated to be 18 934 t/year of total nitrogen and 628 t/year of total phosphorus.

The following table indicates the total nitrogen inputs from Nemunas RBD:

Year River	2010	2011	2012	2013	2014	2015	2016	2017	2018
Nemunas	44056.7700	37032.6989	34366.7050	37751.8158	26240.1117	30777.9197	47775.9577	68091.6400	30030.3000

The following table indicates the total phosphorus inputs from Nemunas RBD:

Year River	2010	2011	2012	2013	2014	2015	2016	2017	2018
Nemunas	1774.0300	1432.0219	1094.3387	1291.0257	924.4287	854.1006	1235.6910	2120.2100	1316.7000

Appendix H. The Keywords used (with the addition of keywords used in Lithuanian)

The table shows the keywords that were used to find the majority of literature, reports and statistics for the thesis. Additionally to the Table 3 used in the Methodology this table shows the relevant keywords in Lithuanian as well. The author used Lithuanian keywords only for Google Scholar because Web of Science does not have papers written in Lithuanian.

RQ	Database platform	Keyword series
RQ1	Web of Science	"Nutrient" AND "Leaching" AND "Organic" AND "Conventional"
		"Organic farming" AND "Conventional farming" AND "Nutrients"
		"Agriculture" AND "Nutrients" AND "Lithuania"
	Google scholar	Organic farming VS conventional farming nutrient leaching
		Organic farming conventional farming nitrogen phosphorus leaching
		<i>In Lithuanian</i> - Ekologinis ūkis Lietuvoje eutrofikacija
		<i>In Lithuanian</i> - Žemės ūkis Lietuvoje ir eutrofikacija
<i>In Lithuanian</i> - azotas ir fosforas tracidinis ir ekologinis ūkis		
RQ2	Not applicable	
RQ3	Not applicable	
RQ4	Web of Science	"Organic farming" AND "Lithuania"
	Google scholar	Institutional development organic farming Lithuania
		Institutional barriers organic farming Lithuania
		<i>In Lithuanian</i> - Žemės ūkio ministerija ekologinis ūkis
<i>In Lithuanian</i> - Ekologinis ūkis Lietuvoje problemos ir planai ateičiai		

Appendix I Total farming area and total number of farms in Lithuania (raw data).

Development of conventional farms over the years 2010-2020. The number of organic farms was subtracted in order to get the number used for conventional agriculture (as suggested by the Agricultural Information and Rural Business Center) and used in the results. The following is the raw data gathered from the Agricultural Information and Rural Business Center database which includes conventional and organic farming:

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hectares	2687269,59	2736503,30	2784280,46	2803196,57	2836553,41	2867752,29	2897032,69	2894525,89	2910282,01	2926751,25	2937302,7
Units	172065	167698	159448	151157	142581	138876	136951	130642	128136	12657	124885

Development of organic farms over the years 2010-2020. The following is the raw data provided by Ekoagros:

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Hectares	149096	157995	166255	171378	167810	220163	225542	239002	244345	246631	240024
Units	2668	2598	2511	2570	2475	2675	2520	2491	2425	2429	2242

Appendix J Nitrogen and Phosphorus leaching.

The table shows the different type of farms (organic & conventional), type of soil, location, crop rotation patterns or types of crops, fertilisers used in the farming, precipitation, depth of the taken samples, amount of leaching of TN and TP and reference used to gather the date. It should be noted, that the data was gathered from different types of farms and countries therefore, the data may vary from location to location and soil type as well as other aspects mentioned in the table below. It should be also noted that there is an evident lack of studies portraying phosphorus leaching while comparing both organic and conventional farming.

Type of nutrient	Type of farm	Types of soil	Location	Crop rotation/types of crops	Fertiliser	Precipitation	Depth of samples (cm)	AMOUNT (kg/ha)	Reference
TN	Organic	N/A	Germany	grass/clover/cereals	Organic manure	N/A	100 cm	24	Kirchmann & Bergström (2001)
			Norway	cereals/potatoes/ley	Slurry & fixation			19	
			Norway	cereals/ley/beet	Slurry & fixation			18	
	Conventional		Germany	grass/clover/cereals	Fertiliser & slurry			46	
			Norway	cereals/potatoes/ley	Fertiliser, slurry & fixation			33	
			Norway	cereals/ley/beet	Fertiliser, slurry & fixation			28	
TN	Organic	Loamy	Denmark	Arable crop farm	N/A	N/A	0 - 25 cm	19	Hansen et al. (2000)
		Sandy		Arable crop farm				36	
		Loamy		Pig farm				30	
		Sandy		Pig farm				61	
		Loamy		Dairy/beef farm				28	
		Sandy		Dairy/beef farm				65	
	Conventional	Loamy		Arable crop farm				32	
		Sandy		Arable crop farm				90	
		Loamy		Pig farm				46	
		Sandy		Pig farm				111	
		Loamy		Dairy/beef farm				48	
		Loamy		Dairy/beef farm				48	

		Sandy						103	
TN	Organic	N/A	Lithuania	Potatoes/wheat/barley/pasture	Animal manure or green manure	Normal	N/A	20.2	Buciene (2008)
						Dry		4.7	
						Excessive		69.1	
	Chemical commercial fertilisers				Normal	36.9			
					Dry	13.6			
					Excessive	69.7			
TN	Organic	Northern Germany	Rape/grass/clover	N/A	N/A	N/A	45.4	Kelm, Loges & Taube (2008)	
							37.5		
							13.2		
			Dairy farms				15.2		
							27.8		
							65.5		
	Dairy farms/grazing		26.2						
			19.5						
			32.1						
	Conventional		Loamy				Rape/grass/clover		45.5
									28.7
									42.2
			Sandy				Dairy farm		22.1
									52.4
									40.1
Loamy	Dairy farm/grazing	38.2							
TN	Organic	Sand, silt and clay	The Netherlands	Barley/maize/peas/potato	N/A	N/A	0 - 30 cm	30	Schrama et al. (2018)
	Conventional							60	
TN	Organic	Clay, silt, peat, sandy clay, loam	Italy, Tuscany	Sunflower/wheat/sweet vetch	N/A	N/A	N/A	10.8	Pacini et al. (2003)
				Barley/broad beans/maize				17.1	
	Conventional			Sunflower/wheat/sweet vetch				25.8	
				Barley/broad beans/maize				28.8	
	Organic	N/A	Lithuania	Potatoes/wheat/barley/pasture		Normal	N/A	0.09	Buciene (2008)

TP	Conventional				Animal manure	Dry		0.11			
					Chemical minerals	Excessive		0.32			
						Normal		0.12			
						Dry		0.08			
						Excessive		0.44			
TP	Organic	Clay	Sweden	Wheat/oat/ley	Certified organic fertilisers	Average (604mm)	0 - 25cm	1.48	Stenberg et al. (2012)		
								0.99			
								4.63			
	Conventional			Wheat/oat	Mineral fertilisers			4.05			
								0.99			
								1.19			
								1.28			
TP	Organic	Loamy	Sweden	Wheat/carrots	Cow slurry	Excessive	0 - 20 cm	15	Riddle et al. (2018)		
							20 - 40 cm	1.8			
							40 - 60 cm	0.2			
	Conventional									60 - 80 cm	0.2
										0 - 20 cm	9.6
										20 - 40 cm	4.6
										40 - 60 cm	4.7
			60 - 80 cm	5.0							