

Local and circular food system in selected Baltic areas

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Abstract

The main objective is to identify the opportunities and obstacles of the green transition and the circular economy as a part of the short food supply chain. The secondary objective is to understand the roles, functions, and knowledge of target groups and stakeholders in the development of local food systems and short food supply chains. The research methods in this study were online ethnography and thematic interviews of stakeholders. This study aims to understand the local food system of the Baltic countries and to identify and analyse aspects to be implemented in a framework for circular food system development in the Baltic countries, especially for the areas of Vilnius, Latgale, and Tartu. This descriptive analysis of the current situation in the Baltic countries describes how stakeholders see the food system in their regions. Results indicate that stakeholders are already making changes in production models but need more support from local authorities to improve through training, cooperation, and incentives. The results obtained in this study will be used to develop the Circular FoodShift model for the Baltic countries.

Keywords: circular economy, local food system, short food supply chain, green transition

Tiivistelmä

Artikkelin päätavoitteena on tunnistaa vihreän siirtymän ja kiertotalouden mahdollisuudet ja esteet osana lyhyttä elintarvikeketjua. Artikkelin toissijaisena tavoitteena on selvittää kohde- ja sidosryhmien roolit, tehtävät ja tietämys paikallisesta elintarvikejärjestelmästä, lyhyistä tuotantoketjuista ja niiden kehittämisestä. Tutkimusmenetelminä tässä tutkimuksessa käytettiin verkkoetnografiaa ja sidosryhmien teemahaastatteluja. Tutkimuksessa kuvataan Baltian maiden paikallista elintarvikejärjestelmää ja pyritään tunnistamaan ja analysoimaan näkökohtia, joiden avulla voidaan kehittää paikallista ruokajärjestelmää kiertotalousmallin mukaiseksi. Tutkimus kohdistuu erityisesti Vilnan, Latgalen ja Tarton alueille. Artikkelissa kuvaillaan Baltian maiden nykytilannetta ja esitellään, miten sidosryhmät näkevät alueensa elintarvikejärjestelmän. Tulokset osoittavat, että sidosryhmät ovat jo tekemässä muutoksia tuotantomalleihin, mutta tarvitsevat enemmän tukea paikallisilta viranomaisilta päästäkseen eteenpäin. Sidosryhmät tunnistivat tarvitsevansa kannustimien lisäksi tukea koulutuksessa ja yhteistyössä. Tässä tutkimuksessa saatuja tuloksia käytetään kehitettäessä Circular FoodShift -mallia Baltian maita varten.

Asiasanat: kiertotalous, elintarvikeketjut, ruokajärjestelmät, kestävä kehitys

1 Introduction

Circular Economy has gained prominence in public discussion and the European Union (EU) as we move towards a greener future (European Commission (EC), n.d.-a). As one of the main building blocks of the EU's Green Transition and the European Green Deal, the European Commission published a Circular economy Action Plan (CIAP) in 2020. This plan aims to establish sustainable products as a norm, i.e., to empower consumers and public buyers in food procurement, to ensure the accumulation of less waste, to make work circular for people, regions and cities, and to lead global efforts on a circular economy. The plan focuses on the sectors that consume the most resources, including food. The European Green Deal aims at Europe being climate-neutral by 2050 (EC, n.d.-b). The Green Deal is also being implemented in agriculture, in line with the From Farm To Fork Strategy (EC, n.d.-c). The aim of the From Farm To Fork strategy is to improve the fairness, and health and environmentally friendly aspects of the European food system. Feenstra (1997) initial review identified steps that leaders and citizens can use to develop own local food systems (LFS).

The circular economy is a production and consumption model based on sharing, renting, reusing, repairing, refurbishing, and recycling of materials and products (European Parliament, 2023). The circular economy is an economic model that moves away from a linear "take-use-dispose" approach to a "reduce-reuse-recycle" approach. The circular economy aims at a closed-loop supply chain (CLSC), in which materials and products that have reached the end of their life cycle are recovered and recycled in a way that preserves their value. The goal of the circular economy in production and consumption models is to use less raw materials, minimise waste and reduce emissions. Raheem et al., (2019, p. 1) stated in their literature review that local digitalisation will enable collaboration between actors in the LFS making traditional food products available in

lager communities through developing the cross-border infrastructures in society.

The food system consists of the food chain and its operating environment (Food and Agriculture Organization of the United Nations (FAO), 2018, p. 1). A food system is, according to the FAO definition, an entity that covers all actors and activities related to the production, aggregation, processing, distribution, trade, consumption, and disposal of food. Food originates from agriculture, livestock, forestry, fishery, and aquaculture. A functioning food system ensures food security (Anderson, 2015, p. 2). In 1996, the World Food Summit defined food security as: “Food security exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” (Agriculture and Development Economics Division (ESA), 2006, p. 1).

A sustainable EU food system operates within planetary boundaries and provides and promotes safe, nutritious and low environmental footprint food for all people (ClientEarth, 2023, p. 5). Its ecosystem services are robust, resilient, economically dynamic, fair, socially acceptable, and inclusive for present and future generations. In 2024, the European Parliament published a legislative Framework for Sustainable Food Systems (FSFS) (EC, n.d.-d). The goal of the FSFS is to enable an accelerated transition to a sustainable food system. The key objective of the legislative framework is to promote policy coherence at both EU and national levels, mainstream sustainability in all food-related policies, and resilience of food system. Innovative technology applications e.g., automation, digitalisation and robotics can be used to enhance operations from harvesting through processing to storage in the whole agri-food value chain (Raheem et al., 2019, p. 5; Chandrasiri et al., 2022, p. 9).

A LFS refers to a network that connects short food supply chain (SFSC) actors within the same geographic region (Vittersø et al., 2019, p. 2) LFS aims to shorten the distance between producers and purchasers. LFS emphasizes ecological and organic farming practices and improves local economies, environmental health, and wellbeing in the community. In the project Capacity Building Methodology of Circular FoodShift, it was stated that circular food is food that is produced, distributed, prepared, and consumed responsibly with the commitment to return the leftover food resources safely to the circular cycle retaining its highest value (Belousa, 2024, p. 6).

Stability in the food supply chain refers to availability, access, and utilization (Pangaribowo et al., 2013, p. 27). Adverse effects on availability, access and utilization are extreme weather, energy scarcity, and disruption in the global markets and it must be recognised that the food and nutrition security may change due to the above mentioned effects. Investment in rural development and promoting as well as supporting sustainable and resilient LFSs are important in improving the development of the markets also at local or regional level.

The food supply chain refers to an entire system of processes involved in getting food from farms to our tables (Đjekić et al., 2021, p. 2). The actors in the food supply chain are producers, distributors or wholesalers, retailers, procurement specialists, and consumers.

The EU Commission defines a SFSC as a limited number of economic operators committed to cooperation, local economic development, and close geographical and social relations between producers, processors, and consumers (Regulation (EU) No 1305/2013). SFSC was defined for the first time in the Common Agricultural Policy (CAP) for 2014-2020 in Europe (EC, n.d.-e). The term SFSC covers several approaches

(European Innovation Partnership for Agricultural (EIP-AGRI), 2019, p. 3; United Nations Industrial Development Organization (UNIDO), 2020, p. 4). Farmers can sell their products directly to consumers on their farms, at farmers' markets, at food festivals and fairs, or through shops. Farmers can also sell products directly to public food services e.g., school and hospital canteens under public procurement schemes and to actors in hotels, restaurants, cafés, clubs, pubs, and private catering companies i.e., to actors in the HoReCa sector.

The primary goal of this study is to identify the opportunities and challenges associated with the green transition and circular economy within the SFSC. Additionally, the study aims to understand the roles, functions, and knowledge of various target groups and stakeholders involved in the development of LFS. The research focuses on LFS in the Baltic countries, particularly in the regions of Vilnius, Latgale, and Tartu, and seeks to identify and analyze aspects that can be implemented in a framework for circular food system development in these areas.

Four topics in this study were: The role of the involved organisation in the current food system, the procurement system and the procurement of green food, Cooperation and communication in the LFS chain, and Sustainability and circular economy in LFS. The first theme was selected to understand the importance of various stakeholders, such as small farmers, food producers, food entrepreneurs, and public food services, in the LFS. The second theme focuses on the efforts to use local raw materials and support SFSC. Here, the challenges and strategies of small farmers, food producers, and public food services in making sustainable and green procurements were examined. In the third theme, the importance of cooperation and communication among stakeholders in the LFS chain was investigated. The fourth theme explored the practices of sustainability and circular economy within the LFS. The results obtained in the four themes studied will be used to develop a Circular FoodShift model for the Baltic countries.

2 Literature review

2.1 Circular food system in Baltic countries

According to the European Environment Agency's (EEA) country profiles (Van Hoof et.al., 2024), all of the Baltic countries Estonia, Latvia, and Lithuania have published strategies, action plans, or white papers for adopting circular economy practices in their national economies. All publications dealt with circular economy in the food industry.

In Latvia, the circular economy action plan includes several policies for the food industry aiming to: 1) an improved material flow and process management e.g., waste management, extended producer responsibility, and deposit systems, and 2) a strengthened municipality role e.g., based on green procurement practice guidelines and a support system dealing with the transition of to purchase services instead of good (European Environment Agency (EEA), 2024a, p. 8). In Latvia, the changes were monitored by using mainly Eurostat Circular Economy Monitoring framework data. According to the country profile, one of the main barriers for circular economy development seemed to be people's consumption attitudes. In the country profile of Latvia, it was stated that it is hard for citizens to change their habits especially when the available waste management infrastructure is insufficient. Therefore, the promotion of public involvement, information, and

education on circular economy must be improved to enable the local population to address challenges and make changes in their consumption habits (EEA, 2024a, p. 9).

In Lithuania, guidelines for transition to circular economy by 2035 have been approved by the national government (EEA, 2024b, p. 8) The six priorities deal with industry, construction, bioeconomy, transport, waste, and consumption. They are based on measures in already planned strategic documents. Specific ministries will be responsible for the implementation. The Ministry of Environment is responsible for the overall coordination. Lithuania is about to appoint an authority for circular economy monitoring and implementation, which will be responsible for assessment, scientific research, and evaluation of international and national trends. The authority has to discover means to improve the existing measures, to set new targets, and to find possible implementation. Currently, there are two food-related circular policies that are included in other policies e.g., in the National Waste Prevention and Management Plan and the Lithuanian Agriculture and Rural Development Strategic Plan 2023-2027 (EEA, 2024b, p. 8). Practical results were e.g., waste management rules on sorting food and kitchen waste, which have been adopted by the Ministry of Environment. Green public procurement has been mandatory in Lithuania since 2023. According to Lithuania's country profile (EEA, 2024b, p 15), the market is the main barrier in the transition to circular economy, these failures include: 1) companies to seize the opportunities of practices in circular economy, 2) lack of consumer awareness and consistent circular economy behaviour, 3) lack of recycling infrastructure, and 4) lack of recycling.

In Estonia, there is no dedicated circular economy strategy, but the government has drafted, coordinated, and approved a circular economy white paper (EEA, 2024c, p. 7). Vision, basic principles, and development directions based on discussions among various ministries and key stakeholders are outlined in this white paper. Further actions will guide and ensure that the circular economy will be dealt with as an overarching framework in planning, consumption, production, policies, lifestyles, culture, and values. The national government has also published a circular bioeconomy roadmap. This roadmap provides an overview of the agreements, and deadlines and monitors progress outlined in the white paper. The primary goal was to raise awareness of new requirements, and support measures among citizens, entrepreneurs, and local and governmental agencies. In addition, Estonia has had a separate project for local governments to increase their circular economy capacity. The project focus was to prepare circular economy roadmaps for all Estonian municipalities. The municipalities mainly prepared the roadmaps themselves in collaboration with the TalTech research group.

Estonia has also introduced a few policies related to the food system (EEA, 2024c, p. 10). One is about food waste prevention, and another is about circular bioeconomy mostly based on agriculture, fishery, and forestry. The main purpose of the food waste plan is to reduce waste and loss in the entire food chain. The second purpose was the afore mentioned circular economy roadmap, which objectives are to: 1) reduce dependence on non-renewable and imported resources with a large environmental footprint, 2) ensure self-sufficiency in food and raw materials and food security, 3) increase resource efficiency, material circulation and the use of by-products and residues as raw materials, 4) strengthen R&D and innovation competences, the development, deployment, and acceptance of new technologies in society, and 5) use the emergence of innovations and cooperation forms e.g., clusters, cooperative business models, industrial symbiosis, and international cooperation, supporting export capacity of companies and foreign investment in the circular

bioeconomy. The latter supports growth of the added value in the circular bioeconomy.

2.2 Local food system and short supply chain in Baltic countries

In scientific literature, the definition of an LFS is ambiguous. Definitions vary widely depending on the purpose of the system and the context in which the activities are organised (Atkočiūnienė et al., 2022, p. 514). Although the definition varies, LFSs can be identified as a blended value of organisations bringing together the public sector, non-profit organisations, businesses, and investments. Different stakeholders within the system are evaluating the system based on how much it is able to strengthen the financial, social and environmental values in the processing, production, consumption of local food products, and handling of food waste. The number of stakeholders depends on the geographical location and boundaries of the system (Atkočiūnienė et al., 2022, p. 515).

According to Atkočiūnienė et al. (2022, p. 515), Peemoeller identified the following five stakeholder groups in LFS: agricultural products producers, agricultural service providers, local government and municipal institutions as well as food consumers. The author stated that the various stakeholders have multiple interests, which need attention and reconciliation. These interests are e.g., farmers aim to sell their produce at the lowest possible cost. Producers strive to ensure a consistent and timely supply of high-quality goods to their customers at the best price, and consumers want a wide range of food products, which have a good taste and an attractive appearance, at low prices. The communities are interested in protecting the environment, meeting consumption needs to achieve a high quality of life, fostering a healthy lifestyle, and developing loyalty to local producers. Traders, local government, and municipal institutions focus on job vitality, quality of life, and local economic growth.

Development of LFS needs to consider an array of different complicated and, sometimes, conflicting viewpoints (Jarzębowski et al., 2020, p. 7). The LFS must activate cooperation between various stakeholders to find common solutions for economic, social, and environmental challenges within the current food system. This article focuses on stakeholders which are producing, processing and serving food.

2.2.1 Small farmers, food producers and sustainable gastronomy

Small-scale farmers and food producers are typically defined by a limited physical size, e.g., the amount of operated land and the number of livestock (Dubois, 2019, p. 768). They are often focused on local markets and sustainable practices**.** Their supply chains are integrated into either processing their agricultural products as foods or producing small quantities of their raw materials themselves. They usually collaborate with various stakeholders e.g., farmers, municipality representatives, food service providers, retailers, and consumers in the system.

Restaurants and cafes play a crucial role in the LFS by acting as central actors in the circular transition (Renfors & Wendt, 2024, p. 8). They influence the entire system through providing sustainable food i.e. providing possibilities for their customers to consume local products. Implementation of waste management practices in these establishments is also part of circular transition. The key strategies include developing sustainable menus, procuring fresh ingredients from local suppliers, reducing portion sizes, using fewer food products in menus, recycling surplus food, as well as tracking, monitoring, and recycling food waste.

2.2.2 Public kitchens in schools and kindergartens

Kindergartens and schools belong to the stakeholder group “Educational communities” in the LFS according to Peemoller’s model (Atkočiūnienė et al., 2022, p. 516). The municipalities or private food service operators tendered by the municipality can provide catering services in the kindergartens and schools.

The Baltic countries have taken steps towards a green transition and a circular economy in the food services of kindergartens and schools. Several kindergartens and schools in the Baltic countries are part of the Eco-Schools programme (Foundation for Environmental Education (FEE), 2023a). The Eco-Schools is an international sustainable development programme, which promotes sustainability and environmental education in schools. It is based on a seven-step framework leading to inspiring and participatory sustainable action. The participants are awarded a Green Flag -certificate once they have fulfilled the programme’s criteria. Responsible food and food waste reduction are one of the themes in the programme (FEE, 2023b). In Latvia, there is a wide network of Green Flag -members (Latvijas Vides izglītības fonds, 2025).

Staff training and environmentally friendly meal choices are promoted in municipality-owned food services in the Baltic countries. Organised Masterclasses are provided for the school cooks in Latvia as a part of the (removed to preserve anonymity). The arrangement of Masterclasses is a step forward enhancing school menus. In the Masterclasses school cooks get knowledge about environmentally friendly and sustainable food, healthy eating and use of vegetables and plant-based products in the menus (Interreg Baltic Sea Region, 2024). In Tartu County in Estonia, there is a catering management development program for schools. The aim of the (removed to preserve anonymity) is to increase food education in schools and to reduce the amount of food waste (Association of Municipalities of Tartu County, n.d.).

There are also several campaigns and projects related to sustainability in the Baltic countries. In Estonia, they have a project called “Vegetable Tuesday” (Taimne Teisipäev, n.d.). This project shares information on how to increase the share of healthy and tasty plant-based food on the menus. The aim of this project is that kindergartens and schools will serve plant-based meals once a week. The project promotes healthy eating habits at an early age.

3 Methodology

This article describes a study that analyses data collected in the (removed to preserve anonymity) 2024, co-funded by the European Union through the Interreg Baltic Sea Region programme. The study examined the LFS in the Baltic countries, with focus on the regions of Vilnius, Latgale, and Tartu. The study aims to identify and analyse the opportunities and barriers to green transition and circular economy in the context of a SFSC. The results will be used to create a circular economy model “Setting the table for a circular FoodShift” for the Baltic countries.

3.1 Materials and methods

Research data was collected as a part of the (removed to preserve anonymity) in spring and autumn of 2024. The data collection methods in this article included online ethnography and interviews. A circular economy model “(removed to preserve anonymity)” for the Baltic countries (Figure 1) will be created based on the

results obtained.

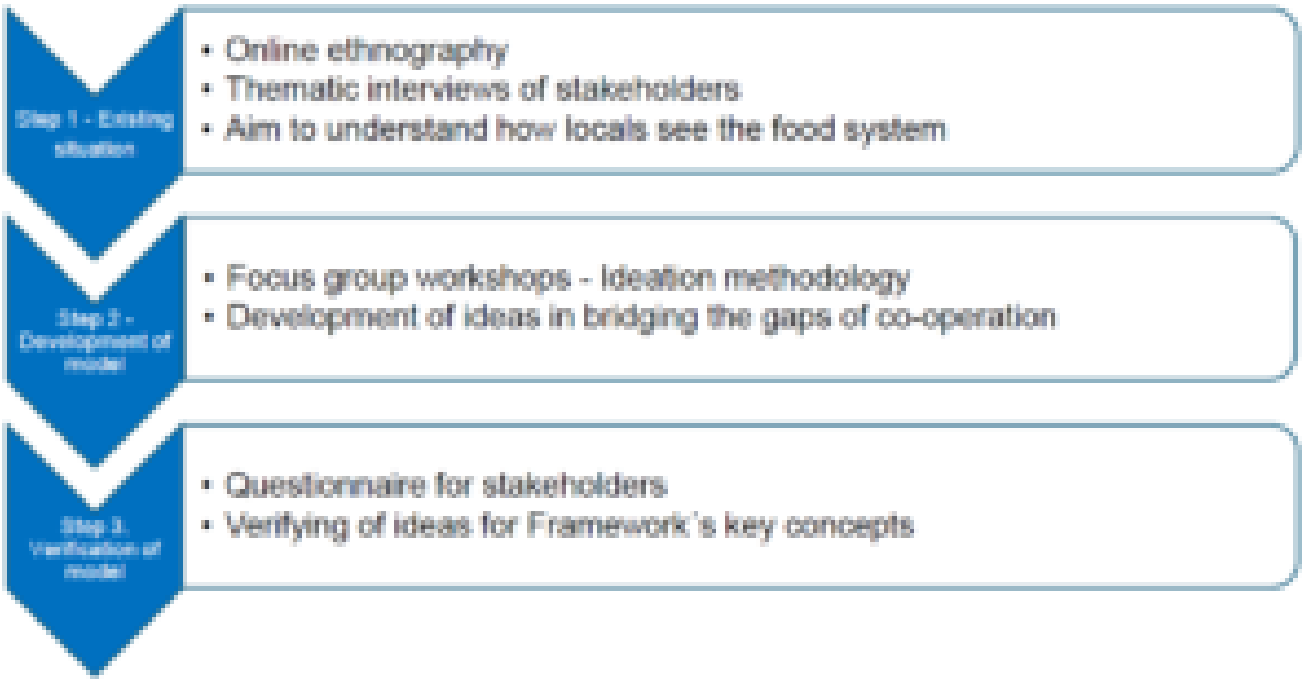


Figure 1. Steps in creating a circular economy model “Setting the table for a Circular FoodShift” for the Baltic countries (Latomäki, 2025).

Once the model has been created, stakeholders will be asked to verify that the circular economy model reflects their views. The latter (Steps 2 and 3) findings will be reported in the second article. Thereafter, the circular economy model will be disseminated to the stakeholders.

3.1.1 Online ethnography

Online ethnography is a research method that applies the principles and methods of traditional ethnography in a digital environment (Nascimento et al., 2022, p. 494). This method focuses on the study of human behaviour and interaction online, e.g., in social media, online communities, on websites, and other virtual spaces. The data was collected from open online environments e.g. open online material from websites produced by food industry operators, and updates including comments and discussions on social media channels from Facebook, Instagram, etc.

In this study, the websites and social media channels of 22 food entrepreneurs in the region of Vilnius, Latgale, and Tartu were analysed. The content and qualitative meanings of the online material and social media channels were recorded in a separate Excel table. Social media posts included in the analysis were published between August 2023 and July 2024. The websites of the companies were accessed during the spring and fall of 2024. The aim of the analysis was to find out how organizations promote sustainable development and the circular economy in their operations, and how they communicate this to their online audiences.

3.1.2 Thematic interviews

The aim of the thematic interviews was to understand the current issues and define common challenges and

common needs for different regions. In the study, 17 Baltic food stakeholders were interviewed about their products, collaborative practices, food system, economic model, circular economy, food waste reduction, and the ways their organisations communicate with other stakeholders.

Respondents were food producers, small farmers, food entrepreneurs, and gastronomy specialists in private and public organisations in the regions of Vilnius, Latgale, and Tartu. The interviews were conducted in English and recorded via Teams.

3.2 Analysis of content

3.2.1 Online ethnography

A data-driven analysis method was used to analyse online ethnography data (Klingenberg et al, 2019, p. 575–582). In data-driven analysis, there is no pre-existing classification framework according to which the material is analysed. The researchers create the classification based on the results obtained. Online ethnography was used to find out the following: date of publications, number of followers, as well as likes, shares, and comments for each publication was sustainable management or type of circular economy included in the publications with texts, pictures, and videos as well as the subject of the publications.

Data gathered through online ethnography were moved to Excel. Themes related to sustainable development and the circular economy were determined based on the data obtained. Analysis contained also information about what and how often companies communicate these themes to their customers.

3.2.2 Thematic interviews

The research questions were sent to interviewees in advance. The actors interviewed were 5 representing small farmers, food producers and food entrepreneurs, 5 representing sustainable gastronomy and 7 representing school food providers. Firstly, the interviewees in the target groups were asked about their opinions on sustainable development, green transition, and circular economy. Secondly, the interviews aimed to determine whether target groups have implemented or plans to implement actions related to sustainable development, the green transition, and circular economy. The interviewees were also asked about possible actions taken already (Fakis et al., 2014, p. 141–144). In addition, companies were asked whether these had received sufficient support at EU level and from regional actors. The interviews of the companies included the following topics: products, local cooperation, food system, economic model, circular economy, food waste reduction and communication forms with customers and other stakeholders.

The interviews were transcribed and thematized. Thematisation was a qualitative analysis method, which aimed to identify central topics or themes in the research material. The themes can be understood as recurring topics in the reported material.

4 Results and discussion

4.1 The role of the involved organisations in the current food system

4.1.1 Small farmers, food producers and food entrepreneurs

Here the authors present the combined results from the online ethnography and thematic interviews group by group, i.e., small food entrepreneurs, small restaurants/cafes and small educational units, in order to show how the actors are recognising the activities they are performing.

All respondents recognized being part of the food system either locally or regionally (Table 1). The respondents emphasised the importance of local markets and local customers. They also mentioned that they wish to sell their products to larger markets through their online shops. Many respondents mentioned that they try to sell their products or raw materials locally or use local intermediaries in the selling. The main reason for not using local raw materials was problems with availability. This was especially the case for producers, who must obey certification rules for organic products. In the review by Hamam et al. (2021) improved processes were found to be important to enhance the competitiveness of local raw materials, which do not compete with nationally available products. The identification of locally available raw materials is important also to make both end-users and policy makers aware of a sustainable market (Hamam et al., 2021, p. 9; Stein & Santini, 2022, p. 77).

Most of the respondents felt that the EU and national regulations are challenging. It has been stated that local food is not the same as sustainable food, but social aspects of the LFS can contribute to rural development and thus the sense of community (Kneafsey et al., 2013, p. 27–28). The local actors would need more help from the government in implementing the new regulations. One of the respondents saw his organization as a “flagship”. This entrepreneur explained that one aspect of the work is to inspire farmers, politicians, and consumers to enable changes in the current food system. This entrepreneur felt that new regulations are not problematic, because when new rules come into force they are implemented. Furthermore, available material in online ethnography about the food system was posted on social media. Here, participants posted information when they were participating in events or projects related to the food system. None of the organisations publicly commented on the regulations.

4.1.2 Sustainable gastronomy

The opinion of the respondents within the gastronomy field is that they have an important role in the LFS from ecological, economic, and social responsibility perspectives (Table 1). From an ecological point of view, they support the regional economy by buying local products. Restaurants and cafes also bring people together and educate them about environmental eating. It was considered that eating and communicating is a part of social responsibility. James (2024) stated that eating locally often means eating seasonally. He continues that eating local food can seem pricey but with the extra cost the consumers get fresher raw materials. Furthermore, they support real people, e.g., neighbours.

All respondents knew some EU and national regulations. They knew their activities should be greener than they are today. They also emphasised that the development of short supply chain depends on cooperation at the regional and local levels. Including other stakeholders is the most important issue for these respondents. One respondent stated that municipalities are interested in improving the conditions for small businesses, but governmental regulations often limit the development of the local economy.

An online ethnography study proved to be good to explore deeper experience, which has shown to be difficult to investigate with traditional ethnography (Gao et al., 2022, p. 7–8). Winter and Lavis (2019, p. 6–7) contributed to the discussion on ethics of online ethnography and digital research more widely. They stated that their research showed that online ethnography is a tool to listen to statements in the entirety. Our results of online ethnography highlighted that organisations are participating in food system related events. The organisations share the lessons learned in participation on social media. None of the organisations were publicly commenting on the regulations.

4.1.3 School food

Participants from schools have a mission and want to make national and regional food systems circular (Table 1). The municipalities stated that the food service in schools and kindergartens has a big role in the LFS. They have already actively shared good practices with other stakeholders e.g., teachers, children, and parents. Regulations and goals of green transition and sustainability were integrated into other areas e.g. projects. Sehnem et al., (2023, p. 23) listed a few limitations in the school feeding management strategies. They stated that official parameters for measuring food waste per school is missing, which makes precise studies hard to perform.

In this study, food service actors believed there was enough public information about the LFS and its sustainability. At regional and municipality levels, the co-operation was fruitful between different stakeholders, but in general, it was not easy to get enough support at the national level. Ministries have written regulations, guidelines, etc., but it was difficult to follow the instructions because ministries did not provide enough information. Furthermore, the responsibility of these issues has been divided among too many ministries. The statement on stakeholder awareness and engagement shows that official parameters are needed to enable foodstuffs' transition in the circular food system (Sehnem et al., 2023, p. 1).

Table 1. The role of various organisations in the current food system (public support and cooperation with other actors in the national and regional food system).

Small Farmers, food Producers and food Entrepreneurs (n=5)	Sustainable gastronomy (n=5)	School food (n=7)
Interviews	**Interviews**	**Interviews**
• All participants recognized being part of the local or regional food system. • Most respondents recognized the importance of public subsidies for energy investments. • Participants wished for more support from public organizations for small actors to improve their activities. • Respondents found new requirements challenging and felt they brought more bureaucracy into their operations. • Assistance should be provided on how to implement new requirements into their operations.	• Respondents thought they have an important role in the local food system (LFS) from ecological, economic, and social responsibility perspectives. • Respondents felt that they support the regional economy by buying local products. • Restaurants and cafes brought people together and educated them on environmental eating. • Employees' well-being was also part of the company's social responsibility. • All respondents knew a few EU-level and national regulations and recognized that their activities should be even greener. • Government regulations often limit the development of the local economy • They emphasised that cooperation at the regional and local level with stakeholders of the short supply chain is the most important thing for them.	• Participants had a mission and wanted to make national and regional food systems circular. • Municipalities stated that public food services have a big role in the local food system (LFS) and actively shared good practices with stakeholders. • Regulations and goals of green transition and sustainability were integrated into all areas and projects. • Foodservice actors said that there is enough public information about the local food system (LFS) and its sustainability. • At regional and municipal levels, co-operation was fruitful between different stakeholders, but it was not easy to get enough support at the national level. • Ministries had written regulations and guidelines, but it was difficult to follow them because ministries do not provide enough information, and responsibility was divided among too many different ministries
Online ethnography (n=14)	**Online ethnography (n=7)**	**Online ethnography (n=1)**
• There were some mentions of cooperation with other stakeholders. • Organisations had collaborated with organizations in food research and biotechnology. • Some participated in international events. • Collaborations and events were shared on their social media platforms	• Organisations shared information about cooperation in the context of participation in food system-related events. • Organisations participated in festivals where they discussed food waste and sustainability and introduced new vegan products to students at events like "Green Ideas". • One organization stated that they were present at SEIMAS, where they discussed plant-based products, environmental protection, and health problems related to eating meat products. • One social organization had also participated in EU-funded projects, and the results are shared and celebrated on social media	In this case study, in the category of School food, there was only one food service actor

Link to table 1 true size

4.2 Procurement system and green food procurements

4.2.1 Small farmers, food producers and food entrepreneurs

In interviews, the organisations stated that they try to use local raw materials and support a short supply chain (Table 2). For some of the producers, the main reason for using local suppliers is both to maintain the quality of raw materials and to reduce transportation time. For organic farms, the rules and regulations of organic farming force them to use certified suppliers. This means that they need to buy their raw material internationally as the raw materials are available neither locally nor nationally. One of the organisations stated that they buy packaging material nationally, but they do not know where the packaging material comes from. The literature has shown that innovatively packaged products have the potential to win customer trust in a constantly changing market (Hidayana Mohd Noor & Mohamad Fuzi, 2024). Thus, the entrepreneurs need to focus on packages must focus on the design of the packages to sell. The use of environmentally friendly packaging materials is an additional improvement along with colour and graphic design. Furthermore, there is a need for a dialogue on the regulatory framework, and on possible legal mechanisms that can support public food procurement programmes and choices to be used in promoting sustainability also in the private food systems (De Schutter et al., 2020, p. 7; Swensson & Tartanac, 2020, p. 5).

In online ethnography, only one organisation stated on social media about its packaging practices. Other organisations are not sharing any information about their procurement strategy or practice on either their website or social media. One organisation mentioned on social media that they are using side streams in their products. They stated that they thus achieved the zero-waste goal.

4.2.2 Sustainable gastronomy

Respondents from restaurants and cafes said that they use ecological, local, and seasonal products in their menus as much as possible (Table 2). The menus were based on local food thinking. One of the respondents stated that they did not use many local products. They knew that they should improve sustainability in the future. For the respondents, it was important to know where and how products have been grown. One of the respondents also cultured organic vegetables and herbs on their own land. This respondent mostly used organic food. The goal of the respondents was to minimise food waste and to have as small an ecological footprint as possible. Environmental aspects had been considered in the procurement procedure, which led to increased prices. It is to be noted that the quality was better. One respondent was surprised that green thinking had increased in the country, even though the governmental movements were slow. As private restaurants and cafés have limited storage capacity, timely, reliable delivery of products ordered is of utmost importance. In French cafes, the chefs dealt with many small suppliers with long-term relationship based on delivery of premium quality products, when procuring fresh food. However, personal beliefs were observed to effect both benefits and barriers associated with sustainable purchasing (Chevallier-Chantepie & Batt, 2021, p. 10–11).

In online ethnography, most of the companies had not published anything about the use of local products on their websites or social media platforms. One company stated, on their website, that 50% of their products were of organic origin. Another company stated in one message on its social media that their pancakes were tasty due to the use of local eggs.

4.2.3 School food

All Baltic countries had their own centralised public procurement system, and the procurements were divided into modules, lots, or baskets (Table 2). A common opinion of food service actors was that the public procurement system was rigid. The public procurement system should be softer than it is today. Local farmers did not participate in public procurements because it was too difficult. Despite this, it is allowed for food services to make small-scale purchases and make sale agreements with small farmers. In procurements, EU Ecolabel can be used as a criterion, but there were no other criteria or practices for sustainable and green procurement. Molin et al. (2024, p. 1) stated that an unsustainable food system contributes to climate change. The procurement in the public food supply chain is complex with four main types of actors, i.e., municipalities, producers, public caterers, and wholesalers as well as many other actors, i.e., media and trade organizations (Molin et al., 2024, p. 5).

Organic food was frequently mentioned by several respondents for promoting environmentally sustainable food procurement (Molin et al., 2024, p. 6–7). In this study the food services wanted to do sustainable and green procurements by buying as much locally produced, organic, plant-based and healthy food as possible. It is to be stated that a green procurement strategy was not yet common in public food services, but the green transition has already started. The research strengthens the understanding of the opportunities to promote sustainable food procurement in a more sustainable food system (Molin et al., 2024, p. 12).

Table 2. Procurement system and green food procurements in the local food supply (LFS) chain.

Small Farmers, Food Producers and Food Entrepreneurs (n=5)	Sustainable Gastronomy (n=5)	School food (n=7)
Interviews	**Interviews**	**Interviews**
• Organisations were trying to use as many local raw materials as possible and support short supply chains. • For some producers, the main reason for using local suppliers was to maintain the quality of raw materials and reduce transportation time. • For organic farms, the rules and regulations of organic farming enforced the use of certified suppliers	• Respondents stated that they used ecological, local, and seasonal products in their menus as much as possible. Menus were based on local food thinking. • One respondent mentioned they did not use many local products but that they needed to work on sustainability in the future. • They thought it was important to support the local community and use local products. • Respondents aimed to minimise food waste and have a small ecological footprint. • Environmental aspects were considered in procurements; the price of products was higher, but the quality was better. • One respondent was surprised that green thinking had increased in the country, even though the governmental movements were slow	• Every country has a centralized public procurement system, and procurements are divided into modules, lots, or baskets. • Legislation and public procurement should be softer. • Local farmers did not participate in public procurements because it was too difficult for them. • Food services can make small-scale purchases and make sale agreements with small farmers. • There were no other criteria or practices for sustainable and green procurements than EU-Ecolabel • Food services wanted to do sustainable and green procurements and buy as much local, organic, plant-based, and healthy food as possible. • A green procurement strategy was not yet common in food services in the municipalities • The green transition had already started
Online ethnography (n=14)	**Online ethnography (n=7)**	**Online ethnography (n=1)**
• Only one organisation stated in social media about their packaging practices, including the type of materials they use. • Other organisations did not share any information about their procurement strategy or practice. • One organization was using side streams in their products and has stated that they achieved a zero-waste goal	• Most of the companies had not published anything about using local products on their website or social media platforms. • One company stated on their website that 50% of their products they use are organic. Other company stated in one social media post that their pancakes are so good because of the use of local eggs.	In this case study, in the category of School food, there was only one food service actor.

Link to table 2 true size

4.3 Cooperation and communication in the local food supply chain

4.3.1 Small farmers, food producers and food entrepreneurs

Cooperation between the various stakeholders was seen as important in the interviews, but there have been some barriers between the stakeholders (Table 3). The respondents stated that independent of different views stakeholders should come together and improve their cooperation. One of the respondents suggested that local government should work as a facilitator in cooperation. Lutz et al. (2017, p. 925) stated that cooperation in various forms is vital for small farmers maintaining LFS systems. Developing agricultural know-how is used to optimize local farming and food supply systems. Cooperation with consumers is crucial in establishing the LFS. The cooperation allow farmers to maintain control of the LFS chains.

Most of the organisations advertised their products using a sustainable angle on their social media. Some of the organisations used social media to share information about third-party competitions, third-party content, and special interest campaigns, e.g., the international vegan-day. One of the organisations stated on its website that they want to build friendly business relationships with government and business in order to promote the idea of sustainability effectively. They also stated that they believe that we all share and care about sustainability.

4.3.2 Sustainable gastronomy

Restaurants and cafes co-operated actively with local suppliers (Table 3). They bought products, e.g., vegetables, cheese, bread, juice, and meat, straight from the local small farmers, food suppliers, and food entrepreneurs. The respondents had typical, regional dishes on their menus. Therefore, they used local products. One respondent mentioned that they have a network of small producers. Some restaurants and

cafes had developed their own food products which food suppliers were selling to other companies. Restaurants and cafes communicated every day about their concepts and menus with their customers. They also communicated about seasonal products and food waste reduction. The opinion of the respondents was that talking about the menu is part of the concept. Almost all respondents said that they also communicate with their customers directly on social media about sustainability e.g., the Green Key -certificate.

According to Paciarotti et al., (2022, p. 179) SFSCs serve consumers at various places including cafes and restaurants. Furthermore, the local food hubs support increased consumption of local food in private dining services as well as coordinate distribution systems for perishable food to these places. The use of SFSCs by the food serving places can also be used to build trust between various groups, to demonstrate the impact in the area and to explain the importance of the SFSCs to policy-makers. This study shows that the organisations had made publications about collaboration with other stakeholders, and they were using social media to educate their target audiences e.g., in sharing information about the environmental impact of food choices. One public institution for social support projects was sharing information about the opportunities they provided people needing support. The same organisation was also sharing information about successful collaboration with other stakeholders within EU funded projects.

4.3.3 School food

The public food services had cooperated and communicated actively in many ways with their customers and stakeholders (Table 3). Kindergartens and schools had their own sustainable development plans, which they updated together with the institutions, parents, children and municipality decision makers. Paciarotti et al., (2022, p. 179) stated that local food hubs also provide a coordinated and optimized food distribution system, which can be used by operators in schools.

There were many events, projects, campaigns and meetings in which food service actors, kindergarten and school children and other stakeholders participate. The aim of the events was to promote healthy eating habits and local and sustainable food.

Table 3. Cooperation and communication in the local food supply (LFS) chain (between target groups and customers).

Small Farmers, Food Producers and Food Entrepreneurs (n=5)	Sustainable Gastronomy (n=5)	School food (n=7)
Interviews	**Interviews**	**Interviews**
• Most of the respondents participated in local networks. • Some respondents had written co-operation agreements with retail customers. • The main channels for reaching out to end customers were websites, social media channels, and word of mouth	• Restaurants and cafes co-operated actively with local suppliers. They bought products (e.g., vegetables, cheese, bread, juice, meat) straight from local small farmers, food suppliers, and food entrepreneurs. • Respondents had regional dishes on their menus and therefore they used local products. • One respondent mentioned having a network of small producers. • Some restaurants and cafes had developed their own food products, which they were selling to other companies. • Restaurants and cafes communicated every day about their concept and menus with customers. They also communicated about seasonal products and food waste reduction. • Almost all respondents communicated about sustainability with their customers directly (e.g., Green Key-label, table game with green-mind questions) or on social media channels	• Food services had cooperated and communicated actively in many ways with their customers and stakeholders. • Kindergartens and schools had their own sustainable development plans, which they plan and update together with institutions, parents, children, and municipality decision-makers. • There were many events, projects, campaigns, and meetings between food service actors, kindergarten and school children, and other stakeholders.
Online ethnography (n=14)	**Online ethnography (n=7)**	**Online ethnography (n=1)**
• Most of the organisations advertised on social media about their products with a sustainability angle. • Some organisations used social media to share information about participating in third-party competitions, third-party content, and special interest campaigns, e.g., International Vegan Day. • One organization stated on their website that they want to build friendly business relationships with government and business to effectively promote the idea of sustainability.	• Organisations published about collaboration with other stakeholders. • Organisations used social media to educate their target audiences, e.g., sharing information about the environmental impact of food choices. • One public institution for social support projects was sharing information about the opportunities they provide for people in need. • The same organisation was also sharing information about successful collaboration with other stakeholders in EU-funded projects	In this case study, in a category of School food, there was only one food service actor

Link to table 3 true size

4.4 Sustainability and circular economy in a local food system

4.4.1 Small farmers, food producers, and food entrepreneurs

All respondents were aware of the importance of sustainability issues in their production (Table 4). The respondents highlighted that they are trying to minimise food waste by optimising the use of all raw materials bought. Few of the respondents highlighted that they are planning to invest in sustainable energy sources. Practices based on circular economy were used in a few companies by providing raw material, e.g., sheep manure, as fertiliser and valorizing side streams, e.g., residuals captured from alcohol production, in their own production from other organisations. Lutz et al. (2017, p. 925) made the remark that small enterprises are reluctant to start-up businesses that are barely feasible economically.

All food entrepreneurs had their own websites. Two of the companies had a separate section for Sustainable Management or Circular Activities on their website. During the last year, two entrepreneurs published only one post about sustainability or circular development. Another one had posted twice. Only one respondent posted news about sustainable activities ten times.

4.4.2 Sustainable gastronomy

Restaurants and cafes had focused on minimising food waste and using side stream materials (Table 4). Their opinion was that their mission is zero waste because waste placed in the garbage bins equals lost money. If needed, they also composted biowaste. In the region, companies recycled and reused everything. The respondents stated that waste recycling needs to be developed at either the regional or national level. The information given must be clear and understandable.

The companies used products, e.g., kitchen uniforms, napkins, tablecloths, and kitchen paper, made from recycled materials. Furthermore, circular economy practices were used by most companies e.g., Green Key -label, solar panels, timber construction, using of clay-plaster, local and organic farming, recycling and reusing, waste sorting, avoiding plastic packs, zero waste thinking, and land heating.

Public institution for social support was sharing lots of information about the social work that they do in the cafe and how they participate in EU-funded projects. One organisation had shared its sustainability targets and certificates on its website but did not make any statements about them on social media. Most of the companies did not share any information about their sustainability or circular economy actions on their websites or on social media.

4.4.3 School food

According to the opinion of these respondents, there could be more national and regional guidelines on the sustainable development of food services (Table 4). The respondents were aware of the carbon neutrality goals on both national and EU levels.

Municipalities already had their own development plans for sustainability. These sustainable development actions were related to waste management e.g., sorting, composting, and reducing food waste as well as to energy efficiency in building and renovating projects e.g., energy saving, using renewable energy, and sustainable purchasing.

Table 4. Sustainability and circular economy in local food system (LFS).

Small Farmers, Food Producers and Food Entrepreneurs (n=5)	**Sustainable Gastronomy (n=5)**	**School food (n=7)**
Interviews	**Interviews**	**Interviews**
• All respondents were aware of the importance of sustainability issues in their production. • Respondents highlighted that they are trying to minimize food waste by using raw materials as efficiently as possible. • A few respondents highlighted that they are planning to invest in sustainable energy sources. • Circular economy practices were used in a few companies by providing raw material (e.g., sheep manure as a fertilizer) and valorizing other organizations' side streams (e.g., residual captured from alcohol production) in their own production	• Restaurants and cafes minimised food waste and used side streams when available. • Their mission was zero waste because waste that goes to the bins is money. • Companies recycled and reused everything possible in the region. • Respondents said that waste recycling needs to be developed at national and regional levels. Information should be clear and understandable. • Companies used products made from recycled materials (e.g., kitchen uniforms, napkins, tablecloths, papers). • Circular economy practices were used by most companies	• Respondents said that there could be more national and regional guidelines on the sustainable development of food services. • Respondents were aware of the EU's and country-level goals for carbon neutrality. • Municipalities had already their own development plans for sustainable development. • Sustainable development actions were related to waste management (e.g., sorting, composting, reducing food waste) and energy efficiency in building and renovating projects (e.g., energy saving, using renewable energy, sustainable purchasing).
Online ethnography (n=14)	**Online ethnography (n=7)**	**Online ethnography (n=1)**
• Two companies had a separate section for sustainable management or circular activities on their websites. • Two organisations had published only one post about sustainability development or circular targets in the last year. • One organisation had posted twice about sustainability development or circular targets in the last year. • Only one organisation had posted ten times about sustainability development or circular targets in the last year.	• A public institution for social support projects shared lots of information about the social work they do in the cafe and their participation in EU-funded projects. • One organization had shared their sustainability targets and certificates on their website but has not made any statements about them on social media. • Most companies did not share any information on their websites.	In this case study in the category of School food, there was only one food service involved

Link to table 4 true size

5 Conclusions

Most of the farmers and producers in this study recognised their responsibility as a participant in the development process of the food system. Some of the organisations were already taking steps towards circular economy. Few respondents highlighted that they share or obtain raw materials from/to other organisations. In restaurants, circularity mostly meant that restaurants try to use raw materials as efficiently as they can. This meant that they are trying to minimise food waste.

Restaurants also used recycled materials in their services. Respondents also highlighted that they consider the issue of waste when they develop new products. One respondent for example altered production based on demand. Most of the organisations did not make any mention of their practices on their website or social media channels. Therefore, we argue that the public did not have enough information about the sustainability actions already taken by the food industry. This might have several consequences. First, consumers might not be able to alter their purchasing habits to greener solutions. Second, public discussion for green transition was not based on facts.

Respondents of school food services had already cooperated, and they communicated actively with their customers and stakeholders in the field of sustainability. Schools had done sustainable development plans, and they arranged events, campaigns, and meetings between food service actors, kindergarten and school children, and other stakeholders.

The study highlighted the importance of cooperation among various stakeholders in the LFS to achieve a successful green transition and circular economy. The research identified that collaboration between small farmers, food producers, food entrepreneurs, and public food services was crucial for the development of sustainable practices and the reduction of food waste. These findings suggested that while there were challenges, such as regulatory barriers and the need for better support from national authorities, the commitment to local sourcing, sustainable procurement, and active communication within the supply chain can significantly contribute to the circular economy. The study also emphasised the role of educational institutions and public food services in promoting sustainable practices and educating the community about the benefits of a circular food system.

This study is a descriptive analysis of the current situation in Estonia, Latvia, and Lithuania. It describes how stakeholders see food system in their respective regions. It is to be stated that more should be done in activities on local circular economy as an operating model to resolve potential obstacles. Together with additional materials, this study will be used to develop Circular FoodShift model for the Baltic states. The created model will be tested with stakeholders, and results will be published in a second article.

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