



TRansition paths to sUstainable
legume-based systems in Europe



UNIVERSITY OF HOHENHEIM



Report of the 3rd Continental Legume Innovation Network (C-LIN) workshop

“Sustainability in legume agri-food chains”

16-17 September 2019, Ljubljana, Slovenia

Hosted by Jozef Stefan Institute

Co-hosted by University of Hohenheim



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www.true-project.eu



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1. Executive Summary

The 3th Continental Legume Innovation Network (C-LIN) workshop was held on the 16th - 17th of September 2019 in Ljubljana, Slovenia, hosted by the Jozef Stefan Institute and co-hosted by the University of Hohenheim. The meeting brought together actors and professionals involved in all parts of the regional legume agri-food chain (LAFC), to interact with members of the TRUE project. The project TRUE (*TRansition paths to sUustainable legume-based systems in Europe*) is involved in the development of European strategies for the sustainable production and use of plant proteins obtained from legumes. An increase in production of legumes is expected to lower the usage of non-renewable resources used in the production of mineral fertilisers. It will also improve crop diversity and increase human and animal consumption of legumes.

An important objective of the project TRUE is to assess environmental, social and economic benefits of incorporating legumes into agri-food chains, as well as to investigate in what way such incorporation is meeting the key goals of sustainable development. The task of the TRUE project is also to engage with different stakeholders in the LAFC. Therefore, the workshop participants were representatives of growers, food industry, transport, trade and consumers, whose activities already incorporate legumes or who are planning to do so.

On the first day of the workshop, we focused on assessing the key sustainability aspects of individual links within the LAFC as well as the chain as a whole. The knowledge gained will help the workshop participants to reach sustainable development targets in their own area of work. Researchers as well as stakeholders taking part in the TRUE project, through the workshop discussions, obtained useful information that will be used for future development of the evaluation model for the assessment of sustainability of the LAFC.

Day two focused on knowledge exchange, showcasing examples of good practice during a field trip. The participants first visited the company **Žito d.o.o.**, a food company that, while modern, maintains its roots in a rich and prosperous tradition. They are constantly following the trends and successfully introducing them into modern production technology with a revolutionary market approach, which includes legumes. The next stop was **Semenarna Ljubljana** – a seed and packing company. Semenarna Ljubljana is one of the region's top providers of quality seeds. Their development is based on their own crops, products and services. They maintain over 70 different seed varieties from 26 plant species (including common beans, soybeans, peas, chickpeas and lentils), of which 37 are indigenous Slovenian varieties. The last stop was at the **Etri community**, a leading group in the field of social entrepreneurship, whose aims are to build an inclusive society and change social norms. They are changing their practice in the fields of ecology, ergonomics and ethical economics. The story of the Etri community is about creating green jobs for individuals, often excluded from society, in collaboration with socially responsible companies. They intend to include more legumes in their meals and at the end of the visit they prepared a delicious legumes showcase lunch for the delegates.

The whole event focused on the five links of the LAFC. **43 participants** (21 females and 22 males) attended the workshop, of which **six were TRUE members that acted as facilitators** and **four were invited government guest** that discussed different aspects of LAFC related topics: regulatory organizations, education and knowledge transfer, financial and business mechanisms and public participation.

2. Introduction

2.1 Background & Objectives

TRUE is funded by the European Commission's Horizon 2020 Programme over four years until March 2021 to explore strategies to reduce the EU's dependency on imported protein food (soybean) and synthetic nitrogen fertilisers. In this context, TRUE aims to identify the best routes, or "transition paths" to increase sustainable legume cultivation and consumption across Europe and includes the entire legume feed and food value chains. During the project, **Legume Innovation Network (LIN) workshops** are organised to involve relevant stakeholders in a multi-actor approach. They take place in three geographical regions with different pedo-climatic conditions: Atlantic, Continental and Mediterranean. In 2021, a final common European Workshop will be organised to build a single European Legume Innovation Network. The workshops are intended to help:

- share legume focused activities with other **networks and actors**;
- exchange insights from **legume-based innovations**;
- collate **challenges and needs** regarding legumes across the entire value chain;
- gather stakeholder assessments on **legume markets and policies**; and,
- Identify key leverage points for **improving framework conditions for legume-based food- and feed-chains**.

2.2 Workshop framework, participants and methodology

The third LIN Workshop provided contributions to the development of European strategies for sustainable production and use of plant proteins obtained from legumes. Each day of the workshop was held in a different location: the **first day** took place at the **City Hotel**, Dalmatinova ulica 15, 1000 Ljubljana. The **second day** we finished the LIN workshop with a field trip, visiting three examples of good practice: the modern food company **Žito d.o.o**, **Semenarna Ljubljana**, a seed and packing company and **Etri community**, a group offering inclusive green jobs for individuals, often excluded from society, where we ended the LIN with a delicious legume lunch.



The workshop brought altogether **43 TRUE members and stakeholders** across the whole LAFC to exchange ideas and compile feedback on various aspects regarding three pillars of the LAFC

sustainability in Slovenia. The workshop included six different categories/experts of stakeholders, producers, processors, transport, market, consumers and policymakers.

On the first day, in addition to short **oral presentations**, a **SWOT session** (Strengths, Weaknesses, Opportunities and Threats) was organized, consisting of five parallel groups. The SWOT analyses provided a framework for the LAFC, to scan both the internal factors (strengths and weaknesses), as well as the external factors (opportunities and threats) of each individual link of the LAFC.



The workshop participants read the results of the SWOT analyses of legume-based agri-food chain.



3. Presentations

3.1 Presentations Overview

The **main points** highlighted during the presentations were as follows.

- The **legume agri-food chain** in Slovenia and an **assessment of their sustainability**.
- **Nitrate pollution** from farm **fertilizers: the “N-timebomb”**.
- Pesticides - **loss of biodiversity**.
- Environmental and human **health issues**.
- **N₂ fixing bacteria** and examples of **good legume practices**.
- Long term **sustainability values**.
- Better **use of resources**.
- **Understanding what people need**.
- Social issues and legume **policies**.
- **Legume regulation** and production in Slovenia.
- **Different chains:** legume food or feed chains.
- **Legume Innovation**-driven future.
- **Circular** economic business **models**.
- **Public participation** and the **impact problem of participatory mechanisms**.

3.3 Presentation summaries

The slides of the presentations have been uploaded to the [TRUE website](#). Direct links can be found at the end of this document in Annex III.

1. Overview about the TRUE project

Pietro Iannetta, TRUE coordinator, The James Hutton Institute, UK

TRUE's perspective is that the scientific knowledge, capacities, and societal desire for legume supported systems exist but that practical co-innovation to realise transition paths have yet to be achieved. TRUE presents 9 Work Packages (WPs), supported by an *Intercontinental Scientific Advisory Board*. Collectively, these elements present a strategic and gender balanced work-plan through which the role of legumes in determining how the 'three pillars of sustainability', 'environment', 'economics' and 'society' may be best resolved.



TRUE realises a genuine multi-actor approach, the basis for which are the three *Regional Clusters* managed by WP1 ('*Knowledge Exchange and Communication*', University of Hohenheim, Germany), that span the main pedo-climatic regions of Europe, designated here as: *Continental*, *Mediterranean* and *Atlantic*, and facilitate the alignment of stakeholders' knowledge across a suite of 24 Case Studies. The Case Studies are managed by partners within WPs 2-4 comprising '*Case Studies*' (incorporating the project database and *Data Management Plan*), '*Nutrition and Product Development*', and '*Markets and Consumers*'. These are led by the Agricultural University of Athens (Greece), Universidade Catolica Portuguesa (Portugal) and the Institute for Food Studies & Agro Industrial Development (Denmark), respectively. This combination of reflective dialogue (WP1), and novel legume-based approaches (WP2-4) will supply hitherto unparalleled datasets for the '*sustainability WPs*', WPs 5-7 for '*Environment*', '*Economics*' and '*Policy and Governance*'. These are led by greenhouse gas specialists at Trinity College Dublin (Ireland; in close partnership with Life Cycle Analysis specialists at Bangor University, UK), Scotland's Rural College (in close partnership with University of Hohenheim), and the Environmental and Social Science Research Group (Hungary), in association with Coventry University, UK, respectively. These *Pillar WPs* use progressive statistical, mathematical and policy modelling approaches to characterise current legume supported systems and identify those management strategies which may achieve sustainable states. A key feature is that TRUE will identify key *Sustainable Development Indicators* (SDIs) for legume-supported systems, and thresholds (or goals) to which each SDI should aim. Data from the *foundation WPs* (1-4), to and between the *Pillar WPs* (5-7), will be resolved by WP8, '*Transition Design*', using machine-learning approaches (e.g. *Knowledge Discovery in Databases*), allied with *DEX* (*Decision Expert*) methodology to enable the mapping of existing knowledge and experiences. Co-ordination is managed by a team of highly experienced senior staff and project managers based in The Agroecology Group, a Sub-group of Ecological Sciences within The James Hutton Institute.

2. European Legume Innovation Network (LIN) Workshops (TRUE WP1)

Henrik Maaß, Research Centre for Global Food Security and Ecosystems, University of Hohenheim, Germany

During the duration of the TRUE project nine **Legume Innovation Network (LIN) workshops** are organised to involve relevant stakeholders in a multi-actor approach. They take place in three geographical regions with different pedo-climatic conditions: Atlantic, Continental and Mediterranean. In 2021, a final common European Workshop will be organised to found a single **Legume Innovation Network** as the legacy of the TRUE project.



The workshops intend to help: *a*, share legume focused activities with other networks and actors; *b*, exchange **insights from legume-based innovations**; *c*, collect **challenges and needs** regarding legumes across the entire value chain; *d*, gather stakeholder **assessments on legume markets and policies** and *e*, identify key **leverage points for improving framework conditions** for legume-based food- and feed-chains. Therefore, the involvement of relevant legume stakeholders, who ideally are multipliers in their field of practice, is key as well as liaising with existing networks dealing with legumes.

The outcomes and results of the LIN workshops provide data especially for the TRUE work packages on markets (WP4), policies (WP7) and sustainability (WP8) to **synthesise information gathered**, to **discern various transition paths**, realise sustainable legume supported feed- and food- systems, and to **identify potential synergies or conflicts between these paths**. It is anticipated that different transitions are necessary for different actors in the various sectors of the feed- and food-chains and for different sections of society and governance structures. The summary of the results of the nine LIN workshops will be presented at the final LIN meeting in Brussels in April 2021. There will be a legume conference together with LEGVALUE, which is another EU-H2020-funded project on legumes.

At this conference the Legume Innovation Network (LIN) will be founded. The aim is, to **establish a legume-stakeholders' forum** to promote awareness and support the uptake of the commercial production of legume crops as well as help realise more-sustainable agri-food systems. The objective of the LIN is to organise stakeholder meetings to encourage the sharing of information between stakeholders and researchers and to promote co-innovation in all aspects relating to the success of legumes. The focus will be on the engagement of stakeholders delivering near-market research innovations across the supply-chain, which include *a.*) all aspects of inputs and production regardless of farm size or type, *b.*) commodity processing and food technologies, *c.*) markets, retailing and marketing, including new markets, *d.*) cultural aspects, including sustainable consumption, and, *e.*) environmental impacts and socio-economics, governance and policy.

There are two LIN workshops outstanding, one for the Mediterranean and one for the Atlantic region.

3. Sustainability assessment of legume agri-food chain

Marko Debeljak, Jožef Stefan Institute, Slovenia

Sustainability is becoming increasingly important in every aspect (scientific, social, environmental and economic) of human life. As a result of the growth of the human population, intensive agriculture has become a major contributor to greenhouse gas emissions and land degradation, therefore, a shift to more sustainable agri-food systems to protect the environment is urgently needed. Assessing the sustainability of a food system is a challenging task, as there is not a simple and measurable indicator to assess it. Instead, it can be defined using various concepts and indicators that describe sustainability through different aspects of **'the three pillars of sustainability'**.



The economic pillar of sustainability represents the fiscal functions and provisions of the food systems, which should provide prosperity (wealth) to the (farming) community and thus refers to the viability of the food system in monetary terms. This definition may extend beyond criteria such as gross margins and profitability, to the expense of commodities and cost of indirect elements such as the value of natural capital or biodiversity, and the fiscal impacts of poor management. **The social pillar** represents several societal functions, both at the level of the community and civil society more broadly and embodies aspects such as awareness and legislation protection of the health of people from pollution, or access to basic resources without compromising the quality of life. **The environmental pillar** represents ecological functions that are connected to the management and conservation of natural resources (water, air, soil, energy and biodiversity) and fluxes within and between these resources.

Marko Debeljak additionally stated that sustainability is a multidimensional concept which can dissect with respect to the different spatial and temporal scales of sustainability, into several component parts, including sustainability level and sustainability indicators. **The sustainability levels** can be observed and defined through different aspects: **Normative level** refers to the previously described building blocks (aspects) of sustainability (environment, economic, social), as well as their interactions (equitability, viability, bearability). **The spatial level** refers to the spatial specifics of sustainability. Sustainability of a food system can be considered/assessed on a local, regional, national or international level. And **the temporal aspects** refer to the time horizon(s) of the sustainability assessment (short-term, long-term). **Sustainability indicators** are quantifiable information, which explains how things are changing over time. The sustainability indicators measure sustainable development and its progress. They must reflect the definition of sustainability and be able to connect partial conditions to policies for sustainable development and monitoring its progress. The indicators can have different levels: **local**, measures the state of the system regarding sustainability; **regional**, compares the system's performance from an economic, social and environmental aspect; plus **national and global**, informs policymakers about the current state and trends in sector performance, and facilitates public participation in sustainability discussions.

3. Sustainability of LAFC: Environmental Pillar

Pietro Iannetta, TRUE coordinator, The James Hutton Institute, UK

Pietro Iannetta presented a few important problems and facts when talking about environmental sustainability.

First problem: reactive nitrogen from farm fertilizers (and animals) are polluting the rocks beneath our feet! This could have several global-scale consequences for rivers, water supplies, human health and the economy. The nitrogen released pollutes waterways and coastal water zones killing wildlife including marine food chains - costing industries and consumers billions. **Second problem:** pesticides use has a harmful impact on biological diversity with short-term toxic effects on



directly exposed organisms and long-term effects can result from changes to habitats and the food chain. The pesticide-intensive use in agriculture has been identified as a major cause of biodiversity loss. Pesticides are present in the environment for decades and pose a global threat to the entire ecological system upon which the production of food and feed depends. They contaminate surrounding soil and water sources, causing loss of biodiversity, destroying beneficial insect populations that act as natural enemies of pests and reduces the nutritional value of food and feed.

The facts: legumes have several positive qualities. Cultivation and the use of legumes for food and feed can contribute to solving a range of **environmental- and human-health issues**. From a farm-agronomic point of view they have the ability to form root nodules symbioses with N₂ fixing bacteria, to add substantial input of N to the soil. Consequently, they supply the following crop with part of its N requirement which reduces the production of energy-demanding synthetic N fertilizer and leads to mitigation of climate changes. However, most legumes consumed in Europe are from imported sources. Therefore, legume production in Europe is very low, and European food systems are highly dependent on human-made agrochemical use, including synthetic nitrogen fertiliser.

But, there are already examples of good practice. For example:

- **Arbikie Distillery:** distilling 'pot-ale' co-product from faba beans (All raw materials used for the Arbikie gin and vodka Distillery are grown at the farm of Arbikie, thus taking full advantage of the benefits of cultivating legumes); and,
- **Barney's Beer:** Barney's bean beers are made of 30% faba bean kernels and 70% barley.

The most frequently used approach to impact assessment is the Life Cycle Impact Assessment (LCA). A large number of companies use LCAs in their sustainability work, for understanding and evaluating the magnitude and significance of the potential environmental impacts of the studied system. This phase involves accounting, assessing, and interpreting the potential environmental impacts generated by the product through categorization and characterization of the workflows.

4. Sustainability of LAFC: Economic Pillar

Shailesh Shrestha, Researcher, Scotland's Rural College, UK

The economic pillar of sustainability is where most businesses feel they are on firm ground. To be sustainable, a business must be profitable. That said, profit cannot predominate the other two pillars. In fact, profit at any cost is not at all what the economic pillar is about. Economic sustainability is an integrated part of sustainability and means that we must use, safeguard and sustain resources (human and material) to create long-term sustainable values by optimal use, recovery and recycling. In other words, we must conserve natural resources today so that future generations will have the possibility to satisfy their needs. Economic sustainability refers to practices that are **economically viable**, enable **long term growth**, have a **minimum negative impact on the environment, social and cultural aspects** and **link the economic pillar with the environmental and social pillars**.



To deliver a more sustainable economy we need to make better use of resources, promote stability and competition, develop skills and reward work, and supply goods and services which meet the consumers' needs, while minimizing their impact on the environment. Economic indicators should therefore include **Snapshot measures** (net income, cost of production), **Future planning measures** (long term investment, profitability), **Vulnerability measures** (market, price, supply) and **Welfare measures** (quality, safety, community, environmental footprint).

5. Sustainability of LAFC: Social Pillar

Tiziana Centofanti, Researcher and Lecturer, Central European University, Hungary

Sustainability is most often defined as meeting the needs of the present without compromising the ability of future generations to meet theirs. It has **three main pillars**: economic, environmental, and social. **Social sustainability** is a process for creating sustainable successful places that promote wellbeing, by understanding what people need from the places they live and work. This refers to the broad terms of public policies that support social issues.

These social issues relate to: **Equity**, satisfaction of basic material needs and quality of life, equality of opportunities, harmony amongst different social groups; **Awareness**, promoting access to education and training, encouraging campaigns and activities to promote information, promoting public health campaigns); **Social inclusion**, encouraging social interactions/networks in the community, conserving physical and social/community characteristics particular to the locality, engendering a sense of pride in the local place); and **Participation**, promoting bottom-up participatory democracy, encouraging participation in collective groups in the community and promoting access to participation in decision making. **The policies** are an essential and key determinant of system functions, and they relate to **fair trade agreements**, commitment to **assist vulnerable groups, support to the short food chain**, ensuring **safety** and **security**, promoting social activities aimed at environmental goals, commitment to integrating **food sovereignty** and **food justice** movements in decision making etc.



The **policy environment for legumes must span all sectors of the agrifood chain**, where legume focused policies are often absent. However, the policy's that do exist are usually confusing and complex.

6. Legume agri-food chain in Slovenia: Regulatory perspective

Matjaž Grkman, Ministry of Agriculture, Forestry and Food, Slovenia

The regulatory framework for legumes in Slovenia changed from 2012 to 2019 and now the production of legumes is **not really regulated**. The only aspect that is supported with regards to growing beans is avoided application of mineral nitrogen. The framework of the EU Common Agricultural Policy (CAP) provided a **coupled support for legume production**, which was introduced in Slovenia in 2016, but withdrawn again in 2017. The reason for this decision were the EU-norms for CAP-support: in 2014, Slovenia produced soybean on 400 hectares and other legumes on 5000 hectares. **In 2016, because of the subsidies, the production of soy bean increased from 400 hectares to 2000 hectares and other legumes from 5000 to 10000 hectares.** The EU Commission responded that the legume production is growing “too rapidly”, and the preconditions for a coupled support were gone and subsidies withdrawn. Still, the soybean production continued to increase in 2017 to an additional 900 hectares, because of farmers being uninformed about the subsidy losses. Consequently, **in 2018, the average production of soybean decreased by 40%**. It is necessary to note that the main purpose of soybean cultivation in Slovenia is not for human consumption, but for the production of feed for farm animals.



Another example is the **CAP Greening - Ecological Focus Areas**. Farms over 15 hectares should be able to use nitrogen-fixing crops (soy bean and other legumes), to fulfil their obligation to receive the full amount of direct payments. Currently, the rules for granting CAP support are not well-formed, especially with regards to beans, lentils, soybean etc. The goal is to **reintroduce the indirect support for legumes through the CAP Greening**.

7. Legume agri-food chain in Slovenia: Knowledge transfer

Emil Erjavec, University of Ljubljana, Slovenia

“Why don’t we have a legume supply chain in Slovenia?” The situation in Slovenia and in rest of the EU is different. To **establish a legume-based chain in Slovenia is a huge challenge**. Slovenia is the lowest ranked country in the EU regarding legume cultivation and the reasons are quite complexed. **The first issue** are the individual links in the chain: talking about agriculture and consumers is not going to fix the problem. We have to take into account the whole system, the whole supply/agri-food chain. The system will work only if all the links in the chain collaborate. If we would like to establish a good supply chain, we need good partnerships and all the links of the supply chain should be developed and merged. There is a huge demand for innovation in this area. **The second issue** is not being specific enough when we talk about chains. We know that there are different chains, **short chains or complex ones**. Furthermore, is the supply chain **for feed or food**? There are **different solutions** for all these various chains. When we select the product and the supply chain, then we can **define innovation**. **Young people** are really motivated to develop new products and 1/3 of the new products are based on plant proteins. We have to **support them**, but not only in a form of a public support. Networks are crucial, a **combination of knowledge and partnerships of different companies** is most needed. This kind of project will provide some ideas and transfer the message that innovation is required. Also, these kinds of projects have to be established, to bring resources and support to young people.



8. Legume agri-food chain in Slovenia: Business and financial perspectives

Jurij Giacomelli, Giacomelli media, Slovenia

“How can we change things? Beans are not competitive! Right?”

Innovation in the field of legumes is needed and consequently, there is a need to invest. Germany is investing 50 billion euro in innovation, but not every country is going down this route to achieve the sustainability development goals and become sustainable. What role do beans have in achieving sustainability? They are a precious resource. They give value to the agrifood chain when they change soil to something edible and other valuable outputs. When you stand in the position of a company, they need to make profits, in all of these circles. So how to do business work in innovative ways, with legumes, to become circular? **New rules are needed**, new regulation at all levels to allow businesses will grow quickly. However, for transitioning to circular business, the most important changes have to arise in the consumer. Another problem when talking about legumes is **how to prepare and cook them?** Today **legumes are often not considered fashionable** and therefore are not a part of our diets. Primarily beans are **part of old systems that represent difficult times**. It is similar to fashion. You have to establish what is beautiful, lasting and rewarding to those that make the “dress”. It cannot be beautiful, if it is demeaning the world we live in. And this should be the same for our food. This is an important component, for the circular economical business model to work.



Incredibly, many things can happen, however for the legume business model to work you **need to create markets**, and for that, we have to **reform the EU agriculture policy, support projects** and distinguish **support to University’s, companies, and institutes**.

10. Legume agri-food chain in Slovenia: Public participation

Anamarija Slabe, Institute of Sustainable Development, Slovenia

Reforming the agriculture policy is connected to public participation. **Public participation** is like a multi-stakeholder workshop, everybody is collaborating and getting some nice results on all areas - environment, economic, social - and especially on the EU level. However, there is one **problem, the impact**. Which impact do we have through all these participatory mechanisms? If you are not a member of an organization, you cannot get projects and consequently you **cannot influence the policy. This is a strong limitation!** Additionally, the agriculture and food sector is so special because it **doesn't change that easily**. As a farmer, you are **limited between the economics on the farm and the policies**. On the other side, there are **consumer demands**, and this can be a hard discussion. A **different CAP is needed**, but not much is happening. Policymakers have to talk to the industry, consumers and get the knowledge and information that is needed to improve the policy. The current CAP that we have is a difficult system that is not fulfilling the sustainability goals. Thereby, organisations are trying to get involved in this because they hope to encourage improvements and they are concerned that if they are not involved, the situation could deteriorate.



If you know what you want to achieve, you will automatically get a lot of answers and solid knowledge on how to do it. **You just have to be at the right place at the right time**. Discussions in Slovenia are just being implemented and we have the proposals for the resolution.

4. Outputs of the SWOT analyses and discussions

4.2 Summary of Stakeholders LAFC SWOT analyses

The goal of the break-out sessions was to assess the current level of the environmental, social and economic sustainability of the legume agri-food chain in Central Europe/Slovenia by Stakeholders. SWOT analysis was performed, for each link of the agri-food chain (LAFC), through the three sustainability pillars. The SWOT Analysis is a tool to solve business problems when answers are not obvious. The analysis consists of the following quarters that require you to look at your enterprise from all angles:

- a. **Strengths:** characteristics of the enterprise that give it an advantage over others
- b. **Weaknesses:** characteristics of the enterprise that place the activities at a disadvantage relative to others.
- c. **Opportunities:** elements in the environment that the enterprise could exploit to its advantage.
- d. **Threats:** elements in the environment that could cause trouble for the enterprise.



SWOT table.

SWOT analysis addressed two main questions in five parallel groups:

1. What are the **strengths** of the discussed link and what **opportunities** are there in terms of achieving environmental, social and economic sustainability? and;
2. What are the **weaknesses** of the discussed link and what are the **threats** that prevent it from achieving environmental, social and economic sustainability?

4.1 Stakeholder SWOT analysis Sessions - breakout-group summary

The stakeholders were divided into five groups, based on their background, for each link of the agri-food chain. They were asked to brainstorm ideas and compile feedback on various aspects in regard to three pillars of sustainability in the legume agri-food chain. Each of the five groups was supported by its own facilitator and a SWOT analysis for the entire legume agri-food chain was performed. During the SWOT analysis, each participant received sticky notes for the four SWOT quadrants.

The participants were instructed to work individually or as a group and write down strengths, weaknesses, opportunities, and threats on the sticky notes, representing each of the four SWOT quadrants.

Once all the quadrants were completed, participants were asked to group similar ideas and then label the **“two most important ideas” of each quadrant.**

This exercise was performed **three times**, for each sustainability pillar separately (environmental, social and economic).

The results were compiled on one poster for each of the five groups. During the coffee break, every participant had one **vote** on each poster (except for their own) to identify the most important aspects. These votes were counted as **points.**



Group discussions on the sustainability aspects of LAFC.

Group 1: Agricultural production

Facilitator: Henrik Maaß



Farmer Jan Mehak explains the results of the Group 1 (Agricultural production) to the stakeholders

Agricultural production includes all activities leading to food, feed and biomass production at farm level (acquiring of resources and inputs, land preparation, sowing, management (tillage, agrochemistry, harvesting). The group included **nine competence stakeholders** that are **directly or indirectly connected with the production of legumes**.

Pillar	STRENGTHS	Points	WEAKNESSES	Points
Env.	Improve soil fertility	5	Crop protection	0
	Improve crop rotation	4	Soil quality	0
Social	Local production + short supply chains	0	Low awareness + knowledge how to use or grow legumes	1
	Producing good protein food	1	Slow knowledge transfer	4
Econ.	Good price for local small farmer	0	No organized farmers to sell legumes	1
	GMO free soy production	1	Machinery missing (harvesting, producing...)	1
	OPPORTUNITIES	Points	THREATS	Points
Env.	Water protection	0	Unstable/extreme weather	0
	Biodiversity/Landscape diversity	2		
Social	New markets for local plant protein food	2	No more coupled payments for legumes	1
	Knowledge availability + transfer	0	Not enough resource on legumes	1
Econ.	Independency from N-fertilizer industry	3	No more coupled payment for legume production	0
	New products and better prices	2	Lack of registered pesticides	0

Group 2: Processing

Facilitators: Tina Kocjančič



Pia Cars provides additional explanations of the SWOT analysis of the Processing link.

Processing includes all activities concerning the manufacturing and transformation of raw materials from the agricultural sector. The group included **seven competence stakeholders** that are **directly** or **indirectly connected** with the processing of legumes.

Pillar	STRENGTHS	Points	WEAKNESSES	Points
Env.	Low energy lines	0	Legumes imported (not local)	3
	Waste management (waste to the industry, feed and organic matter)	0	Packaging could be more environmentally friendly	1
Social	Supporting local (organic) farmers	9	Insufficient income for workers in production	0
	Working with schools (internships)	0	Not enough trainings – lack of specialists/professionals	3
Econ.	Recognizing importance of legumes	0	Market analysis for legumes not present/weak	0
	Legume based products are increasing (different products)	1	High costs of legumes (because of low supply)	0
	OPPORTUNITIES	Points	THREATS	Points
Env.	Waste (other non-food industry: packaging)	0	Possibilities for use of R in industry energy (territory and lobbies)	0
	Growing indicatives for environmentally friendly production/processing	0	Recycling facilities less developed	1
Social	Raising awareness of legume-based diets	3	Knowledge gap (lack of specialists)	0
	Immigrants are often more familiar with legume based diets	0	Still not enough done to promote legumes	0
Econ.	Demand for high protein products is growing	1	Retailers are not promoting legume-based products	0
	More and more vegetarian and vegans	1	Consumers are not used to legume taste yet	0

Group 3: Transport and Distribution

Facilitators: Aneta Trajanov



Facilitator Aneta Trajanov presents the results of the Transportation and Distribution group.

Transportation and distribution include all activities associated with the movement of goods from farm to industry and then to retailers (transportation: farm to market, farm to industry, industry to industry, industry to retailers, industry to distribution centres, distribution centres to retailers). The group included **7 competence stakeholders** that are **directly** or **indirectly connected** with the transport and distribution of legumes.

Pillar	STRENGTHS	Points	WEAKNESSES	Points
Env.	Less energy for storing and cooling	2	Environmental/atmospheric emissions	0
	Not a lot of packaging	0	Land compaction due to heavy machinery	0
Social	Local employment	0	Not attractive jobs in transportation - Low salaries	0
	Sharing machinery	1	Low quality of living due to old machinery	0
Econ.	Lower food loss (less food waste)	1	Low demand on legumes	0
	Cheaper transport due to less packaging	0	Low margin products	0
	OPPORTUNITIES	Points	THREATS	Points
Env.	Short supply chains	9	Exposure to new diseases and pests	0
	Shared use of machinery	0	Poor awareness and infrastructure for environmentally friendly transportation	0
Social	Incentives for innovative and modern transport	0	Lack of awareness for the advantages of transportation of legumes	0
	Education about the benefits of legumes	2	Low demand for legumes	0
Econ.	Shared use of machinery	0	Price of fuel	0
	Development of infrastructure for better transportation	1	Product price vs. transportation price	6

Group 4: Markets and Retailers

Facilitators: Shailesh Shrestha



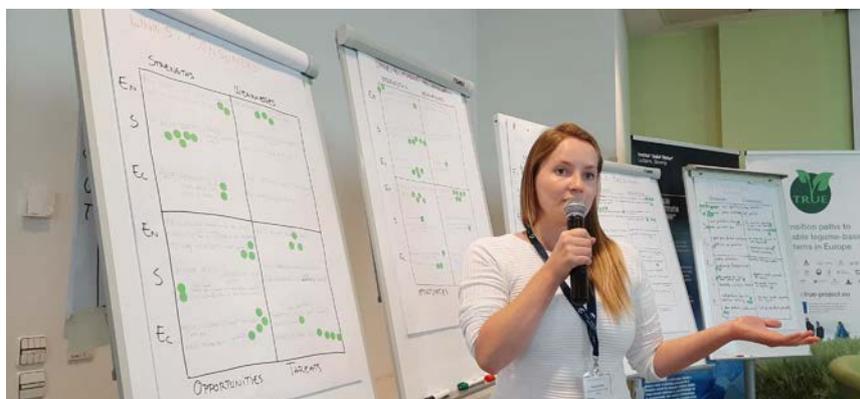
Shailesh Shrestha discusses the results of the SWOT analysis of the Markets and Retailers link.

Markets and retailers include all activities associated with selling of food and feed until the point of sale (storage and display, shelf life, commercialization activities/advertising). The group included **6 competence stakeholders** that are **directly** or **indirectly connected** with the markets and the retailers of legumes.

Pillar	STRENGTHS	Points	WEAKNESSES	Points
Env.	Local products (less transport, packaging)	2	Low cost production	0
	Niche market (premium price)	1	Small portion – more packaging	0
Social	Strong local market (social welfare)	0	Low prices affect social stability	0
	Tradition and culture	5	Limited healthier options	0
Econ.	Premium price	0	Technology lack	1
	Local market	4	Low focus on price	0
	OPPORTUNITIES	Points	THREATS	Points
Env.	Potential benefits (growing concepts)	0	Cheaper import	4
	Branding	4	Low price of meat	2
Social	New products	1	Higher production affecting rotation	0
	New business model (community supported agriculture farmers network)	0	Greenwashing – retailer promoting but not paying premium	1
Econ.	New products + new market strategy + capacity building	1	Cheaper import	0
	Favorable EU policy	2	Lack of policy support	2

Group 5: Consumers

Facilitators: Tiziana Centofanti



Anja Mager gives an additional interpretation of the results of the Consumers group.

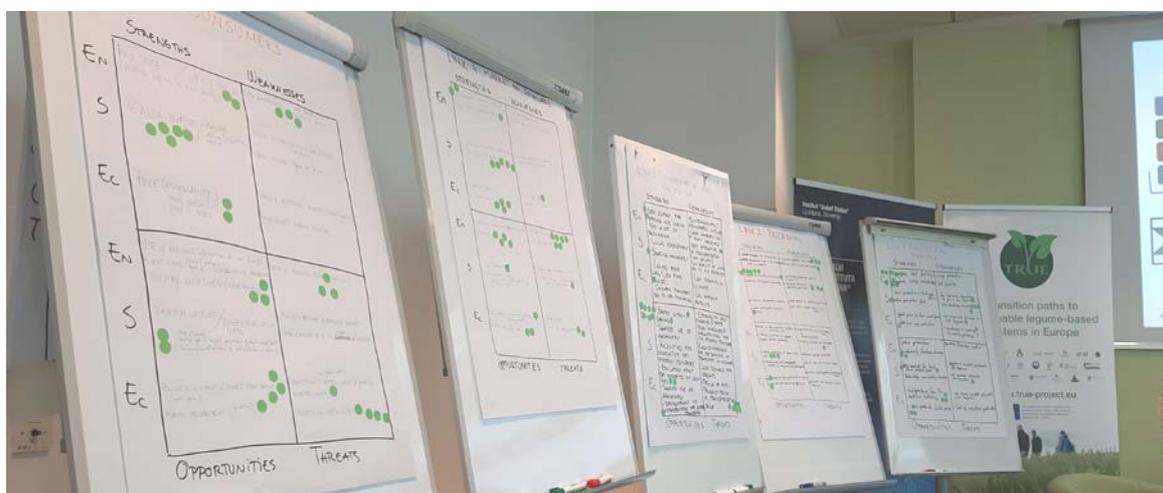
Consumers include all individuals who access or purchase products for the purpose of consumption (including the food sector). The group included **7 competence stakeholders** that are **directly** or **indirectly connected** with the consumers of legumes.

Pillar	STRENGTHS	Points	WEAKNESSESS	Points
Env.	Food choice (Legumes instead of meat, dairy)	0	Lack of knowledge of protein substitutes (legume)	1
	Locally supplied	2	Lack of knowledge of environmental positive impacts	2
Social	Health benefit	5	Social acceptability of side-effects (digestion)	0
	Knowledge hour (cooking, preparation, culture)	0	Social stigma (food for the poor)	0
Econ.	Price (affordable), long shelf-life, easy to store	2	Lack of regional products (Trade agreements)	0
			High price (organic farming)	0
	OPPORTUNITIES	Points	THREATS	Points
Env.	Use of available labeling (information on envi. benefits/ packaging should include environ. benefits)	0	Lack of regional products (food print)	3
	Dietary guidelines (legumes)	3		
Social	Tradition culture	2	Lack of companies supporting legumes	0
	Diversification of diets (apps...)	0	Unfamiliarity with the term 'legumes'	0
Econ.	Policies in support of short food chains (market space)	3	(competition for global markets) Limited choice of quality products (legumes)	1
	Public Procurement (guidelines)	1	Imports of GMOs legumes	4

4.3 Integration of the results from SWOT analysis to the chain level

1. Stakeholder's summary

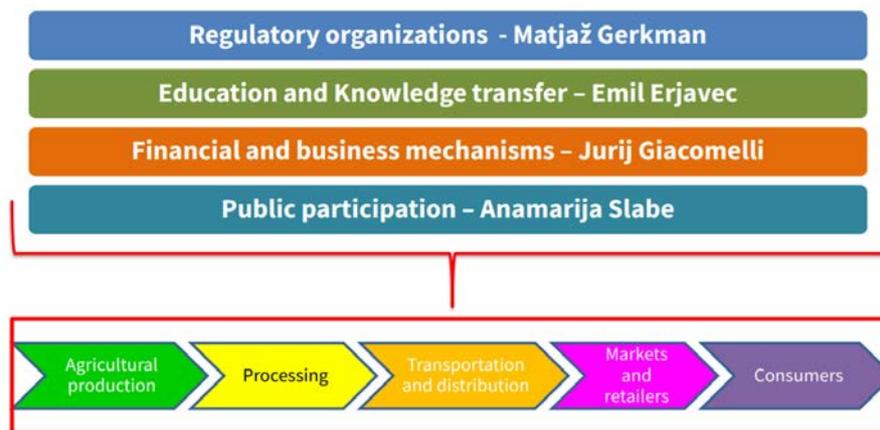
- The transition to a more legume based agri-food chain contributes to a healthier environment and society.
- Innovations in technology and management (infrastructure, machinery, business models, etc.) prevent the weaknesses and threats of the L AFC links that prevent achieving environmental, social and economic sustainability.
- The production of legumes and legume-based products in Slovenia faces many obstacles, mainly because of little political support.
- Knowledge and education regarding legumes bring awareness of the benefits that a transition to more legume-based systems can bring.
- Efficient resource use (food loss, packaging, electricity, etc.) in L AFC represents strengths and opportunities in terms of achieving environmental, social and economic sustainability.
- Pressure on the environment (low biodiversity, high emissions, waste, etc.) present weaknesses and threats of the L AFC links.



Flipcharts with the final results of the SWOT analyses, on which the participants marked their priorities of the SWOT items.

2. Government representative's summary

Results of the SWOT sustainability analysis of individual links of the LAFC cannot be simply summed up to the chain level. Information about the state of the chain is very relevant for the top decision makers: Ministries, Agencies, Chambers, Unions, etc. Results of the analyses of individual LAFC links will provide inputs to integrated assessment modelling for the development of strategic decisions on sustainable development. A final discussion with inputs from experts representing regulatory organisations, education and knowledge transfer, financial and business mechanisms as well as public participation compiled the SWOT results.



Integrated assessment of the LAFC from four strategic perspectives.

- “The new regulation in Slovenia is going to improve. When we took away the subsidy in 2017, the production of legumes in Slovenia got smaller and the farmers went back to cereal production. That’s why we have to learn to make smaller steps and reach a proper range for Slovenia with subsidies. Additionally, in the future we have to consider our regions. Posavje, Pomurje, Pomurje are not the same, and this has to be considered.”

(Matjaž Gerkman)

- “If we talk about individual links, like agriculture or consumers, we are not going to fix the problem. We have to take into account the whole system. The biggest problem in Slovenia’s LAFC is the lack of innovation, in all possible senses. For me the knowledge is the base for change, we have to develop not only particular solutions, but we have to develop the channels. I hope this kind of project will provide some ideas and that we will all realise that we need innovation!”

(Emil Erjavec)

-
- *“Knowledge exists. This SWOT analysis is the best microscope that is telling us where we are, how things look like and where we are going. To make some changes we have to collaborate and engage ourselves to take risks and to step out of the comfort zone and invest in our future! I am pretty optimistic that we need maximum 5 years to make a change, and then even policy will follow.”*

(Jurij Giacomelli)

- *“We believe that knowledge is the answer to everything. More and more people are aware that there is a problem on a global systemic level, on policy level. And I think that this is the solution. The younger generations have good knowledge about the environmental, social, and economic sustainability. It is good to hear that the consumers and all the actors in the agri-food chain are aware of the benefits that a transition to more legume-based systems will bring!”*

(Anamarija Slabe)



Roundtable discussion on the integrated assessment of the LAFC.



Annex I – C-LIN programme

DAY 1 - Sustainability of legume agri-food chains (L AFC) - Workshop

Monday, 16. 9. 2019, Venue: City Hotel, Dalmatinova ulica 15, 1000 Ljubljana

08:30 Arrival and Registration

9:00 Introduction to the workshop

(Marko Debeljak and Aneta Trajanov, Jožef Stefan Institute)

- Welcome, presentation of the purpose and objectives of the workshop and the workshop agenda

9:15 Content of the workshop

- **Overview about the TRUE Project**

(Pete Iannetta, coordinator of TRUE project, The James Hutton Institute)

- **European Legume Innovation Network (LIN) workshops**

(Henrik Maaß, University of Hohenheim)

- **Sustainability of legume agri-food chains (L AFC)**

(Marko Debeljak, Jožef Stefan Institute; Pete Iannetta, The James Hutton Institute; Shailesh Shrestha, Scotland's Rural College and Tiziana Centofanti, Central European University)

10:15 Coffee break

10:30 Sustainability assessment of L AFC links

- **Working approach to SWOT analysis** (Marko Debeljak, Jožef Stefan Institute)
- **Break out groups and SWOT analysis of L AFC links** (all workshop participants)
 - Agricultural production
 - Processing
 - Transportation and distribution
 - Markets and retailers
 - Consumers

12:30 Lunch

13:30 Continuation with the SWOT analysis

- Priority list of SWOT items
- Integration of SWOT items
- Summary points



14:30 Coffee break and SWOT posters session

15:00 Summary of the SWOT analyses of each LAFC link

(Rapporteurs of each link)

15:30 Integration of the partial sustainability assessments to the chain level

- **Working approach** (*Marko Debeljak, Jozef Stefan Institute*)
- **Regulatory perspective** (*Matjaž Grkman, Ministry of Agriculture, Forestry and Food*)
- **Knowledge transfer** (*Emil Erjavec, University of Ljubljana*)
- **Business and financial perspectives** (*Jurij Giacomelli, Giacomelli media*)
- **Public participation** (*Anamarija Slabe, Institute for Sustainable Development*)

16:30 General discussion

17:00 Closing of the first day of the workshop

DAY 2 - Sustainability of legume agri-food chains (LAFC) – Field trip

Tuesday, 17. 9. 2019, Meeting point: City Hotel, Dalmatinova ulica 15, 1000 Ljubljana

8:30 Meeting in front of City Hotel, Ljubljana

9:00 Visiting some examples of good practice (*Visiting Žito; Visiting Semenarna*)

13:30 Lunch prepared by the Development Cooperative Etri

15:00 Return to the City Hotel Ljubljana



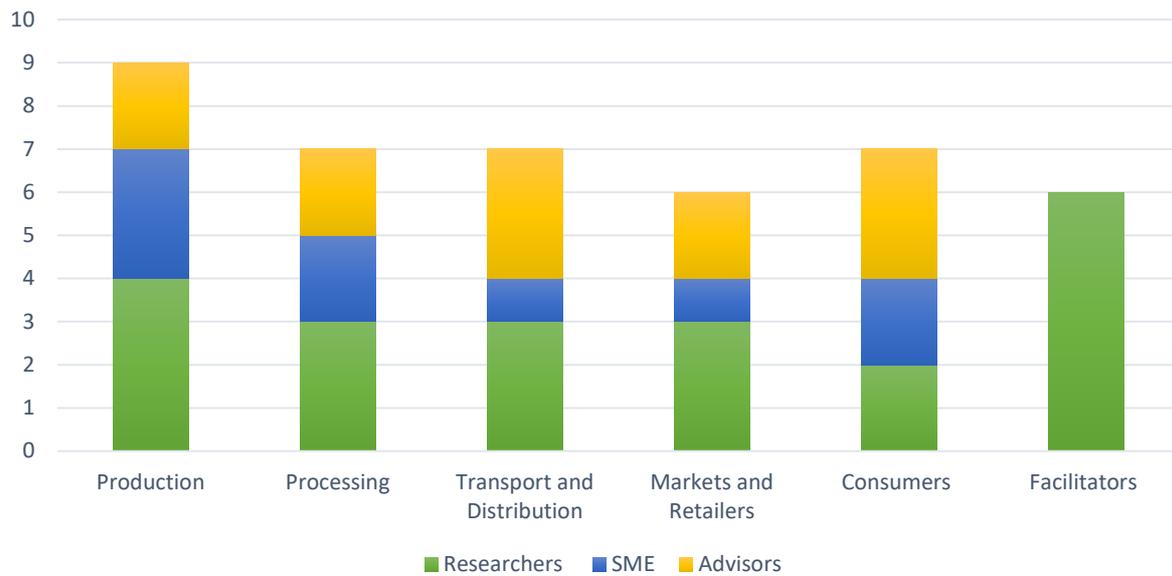
Discussion of the workshop participants with the representatives of the Žito d.o.o.



Selection of legume seeds from Semenarna Ljubljana.

Annex II – Participants

Stakeholder groups



Structure of the stakeholder groups involved in the SWOT analysis.

Table 1: Number of participants of each stakeholder group

Production	Processing	Transport	Markets	Consumers	Facilitators
9	7	7	6	7	6



List of Participants

Listed here are only those, who explicitly agreed to have their registration details published in this document.

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Annex III - Presentations pdfs

A copy of all the presentations have been uploaded to the TRUE website [here](#).

Presentations (direct links)

- **Presentation of the purpose and objectives of the workshop and the workshop agenda.** - Marko Debeljak and Aneta Trajanov, Jožef Stefan Institute
- **Overview about the TRUE Project** - Pete Iannetta, coordinator of TRUE project, The James Hutton Institute
- **European Legume Innovation Network (LIN) Workshops** - Henrik Maaß, University of Hohenheim
- **Sustainability of legume agri-food chains (L AFC)** - Marko Debeljak, Jožef Stefan Institute
- **Sustainability of L AFC - Environment** - Pete Iannetta, The James Hutton Institute
- **Sustainability of L AFC - Economy** - Shailesh Shrestha, Scotland's Rural College
- **Sustainability of L AFC - Society-Policy** - Tiziana Centofanti, Central European University / ESSRG
- **Sustainability assessment of L AFC links with SWOT analysis** - Marko Debeljak, Jožef Stefan Institute
- **Integration of the partial sustainability assessments to the chain level** - Marko Debeljak, Jožef Stefan Institute
- **Regulatory perspective** - Matjaž Grkman, Ministry of Agriculture, Forestry and Food (no slides)
- **Knowledge transfer** - Emil Erjavec, University of Ljubljana (no slides)
- **Business and financial perspectives** - Jurij Giacomelli, Giacomelli media
- **Public participation** - Anamarija Slabe, Institute for Sustainable Development



Acknowledgements

We would like to thank **all participants** for their valuable contributions and insights in their experiences, the **TRUE project members** for their work as facilitators and the guests of the panel discussion for their inputs. We also thank **City Hotel** for hosting the conference and we thank the examples of good practice, **Company Žito d.o.o., Semenarna Ljubljana and Etri Community** for the guided tours around their premises.

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