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Improving food system sustainability through technological, social, and organizational innovations in intermediate food value chains EFFoST Conference 2021

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Improving food system sustainability through technological, social, and organizational innovations in intermediate food value chains

Katherine M Flynn, Luis Mayor, Luminita Ciolacu, Geneviève Gésan-Guiziou

EFFoST Conference 2021

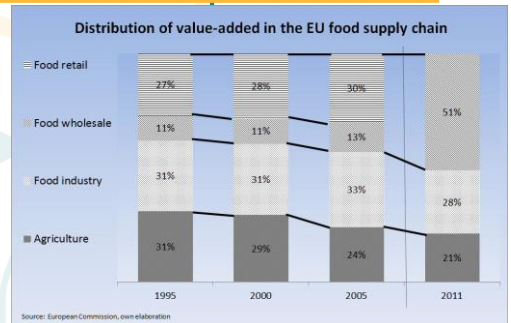
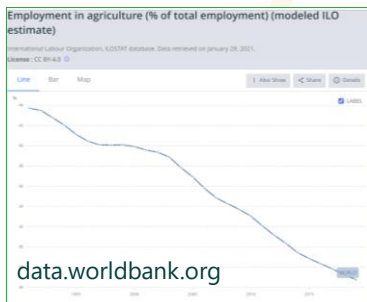


This project has received funding from the European Union's funding programme H2020 research and innovation programme under grant agreement 101000723.

Food systems contribute to societal problems.

• ECONOMIC

Unbalanced distribution of wealth: Agriculture receives 21 % of the value in EU food chains; 51% goes to food retail and food services



• SOCIAL

Rural employment declining: Between 2005 and 2017, the agricultural workforce decreased by 25% and is expected to decline *a further 28%* between 2017 and 2030

Food systems contribute to societal problems.

• ENVIRONMENTAL

Increased Packaging and Waste: Europeans will use 953 billion food packages in 2018-2020. (UNEP, Plastic waste causes financial damage of US\$13 Billion to marine ecosystems each year as concern grows over microplastics, 2014)



• HEALTH

'Ultra-processed' food linked to obesity and cancer: Due to product composition (e.g. high salt, sugar, fat), additives, or neo-formed components (Srouf, B. et al. (2019), British Medical Journal, 365, n° 1451)



<https://www.health.harvard.edu/blog/what-are-ultra-processed-foods-and-are-they-bad-for-our-health-2020010918605>



Dominant long food supply chains



Food Supply Chain. Source: The Chicago Council on Global Affairs

Dominant long food supply chains

- Profit concentration
- Rural areas decline
- Environmental damage
- Highly processed products



- Low paying service jobs (Uber Eats)
- Increased rural poverty
- Factory farms, deforestation
- Non-communicable (diet-related) diseases

- Lower prices
- One-stop shopping
- Long shopping hours
- Easily accessible location
- Large choice of products



- Strong economic activity
- Resource efficiency
- Economies of scale, mass production

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Trendy short food supply chains



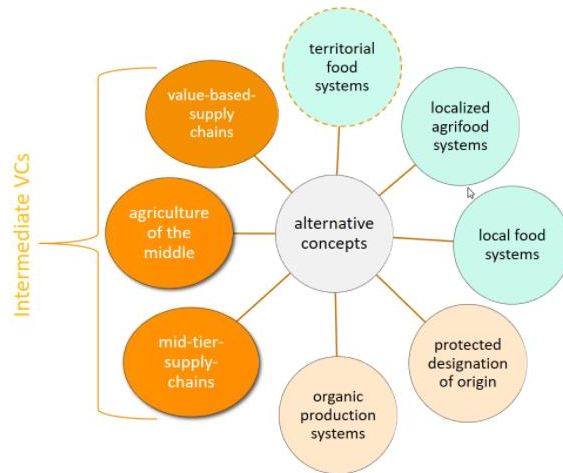
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Concepts of alternative food value chains



○ many different concepts and empirical examples of alternative food value chains

○ depending on their characteristics and size, **short** or **intermediate value chains**

Graph based on Fleury et al. 2016, p.5



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Working definition

- Cooperation
- Small and medium size actors
- Network
- High quality regional food
- Beyond the local market
- Fair distribution of value
- Innovation
- Common values
- Collective governance
- Transparency and trust
- Regional/interregional level
- Few intermediaries



*Intermediate food value chains are characterized by the **cooperation** of mainly **small and medium-sized actors** - from farmers, to processors, distributors, retailers, supporting organizations, other enterprises and consumers along the food value chain in a **network or strategic alliance**.*

*Together they supply **high-quality regional food products** to consumers beyond the local market in **greater quantities** with facilitated access for consumers.*

*Intermediate value chain aim at creating **win-win situations for all actors** involved, through **collaboration**, by **fair distribution of value created** and the implementation of technological, social and organizational **innovations** in the food value chain.*

*The actors commit to common **values**, **collective governance** and are **creating trusted and transparent relationships**.*

*Operation and distribution is at **regional to interregional level** with **fewer intermediaries** than in long VCs, but **minimum one intermediary**.*



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Innovations to support IFVCs.



• TECHNOLOGICAL

- **flexible filling machine** to reduce environmental footprint
- **ICTs: GPS tool** to localize wild berries **& blockchain technology** to improve traceability and transparency
- **Valorization of streams currently considered as waste:** whey, fruit & vegetables, and pits

• SOCIAL

- **Sharing of processing equipment and/or infrastructure**
- Logistical models **which reduce the consumption of packaging** (returnable packaging)
- **Innovative funding systems** based on philanthropic income streams

• ORGANIZATIONAL

- **food innovation incubators** to support a sustainable economic development of regions



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TECHNOLOGICALLY INNOVATIVE! Innovations: Blockchain technology

A third of consumers increased cheese consumption during the pandemic!



- a QR code tells consumers the origin of their cheese and when, where and how it was produced
- supports local actors to standardize their services
- enhances trust of the consumers by improving traceability and transparency.



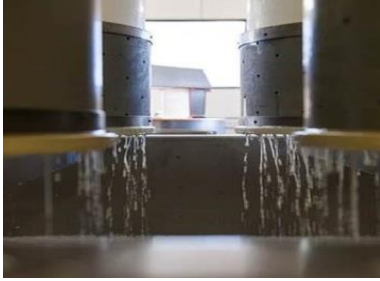
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TECHNOLOGICALLY INNOVATIVE!

Innovation: "Waste" streams for food / cleaning



- Why to develop beverages
 - why from three cheeses tested for taste and other organoleptic properties
 - Now testing flavors to add to whey drinks.

- Fruits & vegetable unfit for consumption to produce alternative cleaning agents

- Pits valorized via pyrolysis



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10% malt vinegar can rapidly and completely inactivate influenza virus!

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Innovations: Funding sources

- innovative business models based on philanthropic funding systems.

Strategic philanthropy boosts impact



news.cuna.org

SOCIALLY INNOVATIVE!



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ORGANIZATIONALLY INNOVATIVE!

Innovations: Food incubator

Smallholder farmers produce 70–80% of the world's food!

- a place where actors of the food value chain have access to innovation, knowledge and services
- a co-design approach for sustainable economic development of regions and to create and expand food businesses



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Innovations : A hygienic, flexible, and portable filling machine

reduce environmental footprint with green/sustainable packaging materials

- adapted
 - to the products
 - to changing quantities due to seasonal variation
- can be shared between producers



TECHNOLOGICALLY and SOCIALLY INNOVATIVE!

Reduce, reuse, recycle and **RETHINK!**



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TECHNOLOGICALLY and SOCIALLY INNOVATIVE! Innovations: GPS tool

A mere 2-5 % of berries in Swedish forests are picked!



- Berry pickers can easily find the location of wild berries in the Swedish forests
- more local people pick berries
- help local berry companies to develop.
- Tested by the users in spring/summer 2021



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Innovations: Innovation Platform



HOME INNOVATION HUBS * INVENTORIES * NETWORKING * TRAINING GAIN MODEL REGISTER/LOGIN

Sustainable Food System Innovation Platform

The central objective of the SMARTCHAIN Project[®] is to foster and accelerate the shift towards **collaborative short food supply chains** (SFSC) and, through specific actions and recommendations, to introduce **new robust business models** and **innovative practical solutions** that enhance the competitiveness and sustainability of the **European agri-food system**.

After the official end of the SMARTCHAIN project (31/08/21), 5 new H2020 projects (CO-FRESH[®], FAIRCHAIN[®], & PLOUTOS[®] (RUR-06-2020) and LOWINFOOD[®] & FOODRUS[®] (RUR-07-2020)) will continue the maintenance and growth of this Innovation Platform with their results, findings, and contributions. These projects work to increase the competitiveness and sustainability of agri-food value chains through innovations, new approaches and effective ways to reduce food losses and waste. Stay connected to the Innovation Platform to keep up with all of the latest on innovative food systems!

The SMARTCHAIN Innovation Platform facilitates knowledge, innovative practical solutions and know-how transfer. Particularly, the Platform aims to:

- Generate, share and utilize information on suitable innovations;
- Engage stakeholders in the SFSC sector;
- Disseminate SFSC innovation and cooperation events;
- Organize training activities and generate training materials on best practices in innovation;
- Build an international community through a short food supply chain game.

You can **help us improve our Platform** by answering a short online **questionnaire!**

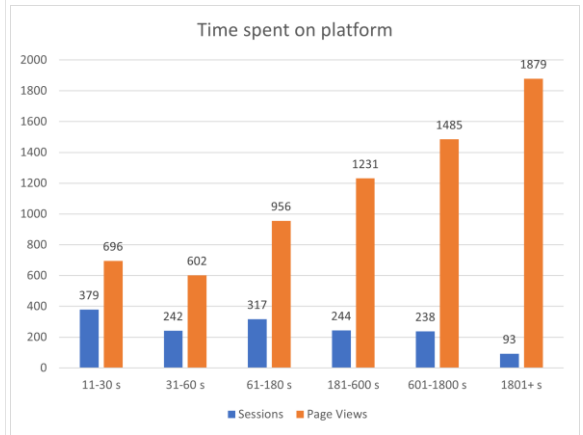
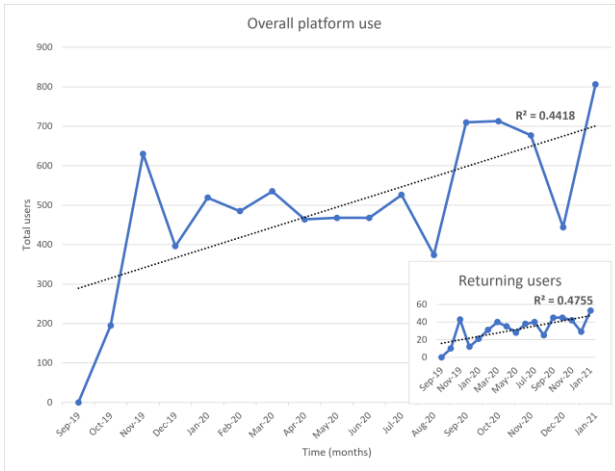


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Innovations: Innovation Platform



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Stakeholder input to test and improve innovations

Goals of the Co-Creation Approach

- Integration of expertise from **different stakeholders**
- Including and addressing stakeholders and actors across the **entire value chain**
- Generation of new perspectives on each of the case studies
- **Continuous exchange** between the different FAIRCHAIN case studies will provide new insights from other areas of expertise and can lead to spill-overs.
- Through co-creation, FAIRCHAIN aspires to foster collaboration and partnerships among stakeholders that can thrive and grow **beyond the duration of the project**.
- Design of **new/reconfigured intermediate value chains** in each case study
- **Fair(er) distribution of benefits and risks** along the value chain

Methodology overview
The FAIRCHAIN Co-creation process

Task 1.3: WS1: Goal defining workshops	Task 1.4: WS2: Implementation workshops	Task 1.4: WS3: Mid-term review workshop	Task 1.5: WS4: Final review workshops
Concept development, test and training workshop	Concept development, test and training workshop	Concept development and moderation for all case studies	Concept development, test and training workshop
CASE STUDY Austria	CASE STUDY Austria	CASE STUDY Austria, France, Sweden, Belgium, Greece, Switzerland	CASE STUDY Austria

WS1: Goal defining, WS2: Implementation, WS3: Mid-term, WS4: Final review



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FAIRCHAIN is HOT

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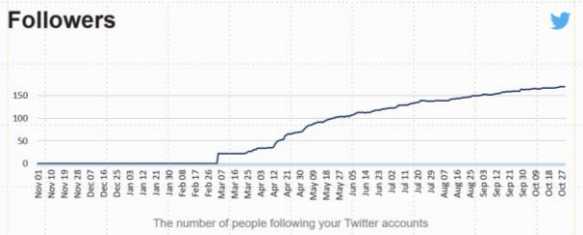
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Project ID card



Acronym	FAIRCHAIN
Title	Innovative technological, organisational and social solutions for FAIRer dairy and fruit and vegetable value CHAINS
Topic RUR-06-2020	Innovative agri-food value chains : boosting sustainability-oriented competitiveness under the programme SC 2 "Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy"
Budget & funding	Overall budget: 8 036 566 € EU contribution: 6 996 636 €
Duration	1 November 2020 - 31 October 2024 (48 months)
Consortium	20 partners from 8 countries

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Objective

Enable small and mid-size farmers and food producers to scale up and expand production of nutritious food through **competitive intermediate value chains** at the local and regional level.



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Technological innovations

- **Flexible filling machine** using green/sustainable packaging materials; designed to fulfil hygienic requirements; and adapted to short up to long production run
- **Emerging postharvested technologies adapted to co/by-products**
 - Innovative beverages based on whey
 - Cleaning agent from fermentation of unfit for consumption co-products from food and vegetable processing
 - Co-product (kernel) valorisation via pyrolysis
- **Information & Communication Technologies (ICTs)**
 - GPS tool to effectively localise wild berries
 - Application using blockchain technology to select, retrieve and interpret measurable data from operational processes



FRANCE

Production of innovative dairy drinks or desserts based on co-products of cheese manufacturing

- **Current situation requiring improvement**
 - Whey, a by-product of cheese production, is not sufficiently exploited.
 - Small producers need to generate revenue from whey. However, collection is difficult as they are often isolated
 - Small producers cannot afford the installation of bottling lines needed to produce whey-based drinks.
- **Main activities in FAIRCHAIN**
 - Use whey to develop valuable products, in particular healthy whey-based drinks.
 - Bring a zero-waste aspect to the distribution of fresh/room temperature liquid products.

Organisational/social innovations

- **Sharing of processing equipment and/or infrastructure**
- **Logistical models** which reduce the consumption of packaging (returnable packaging)
- **Innovative funding systems** based on philanthropic income streams
- **Food innovation incubator** for co-creation of solutions by different actors in a regional value chains.

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Consortium

Research

INRAE, RISE, FH JOANNEUM,
Fraunhofer-Gesellschaft,
Universiteit Gent

SMEs

Scaldopack, Petrel,
Laboratoires Standa,
Sofies SA, Biofruits SA,
Cogiterre SARL,
Synexilis, Stymfalia

Industry

Pack4Food, Greenyard,
Sodiaal

NGOs

Confagricoltura, ISEKI-
Food, ACTIA, Make.org

A multidisciplinary partnership including **20 organisations in eight countries.**

PARTNERS

- INRAE, PETREL, STANDA, SODIAAL, ACTIA, MAKE.ORG
- FRAUNHOFER GESELLSCHAFT
- CONFAGRICOLTURA
- UGENT, SCALDOPACK, PACK4FOOD, GREENYARD
- RISE
- SOFIES, BIOFRUITS, COGITERRE
- JOANNEUM
- SYNEXILIS, STYMFALIA



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The logos are arranged in a grid-like fashion. The top row includes INRAE, RI SE, FH JOANNEUM University of Applied Sciences, GHENT UNIVERSITY, Fraunhofer ISI, and ACTIA. The second row features Pack4Food, Confagricultura, PETAJ COMMERCE CIRCULAIRE, scaldopack, sofies leading sustainability, and SYNELIXIS. The third row contains Bi fruits, Cogiterre, Stymfolia, ISEKI Food Association, MAKE.ORG FOUNDATION, and SODIAAL INTERNATIONAL. The bottom section is titled 'Linked third parties' and includes GREENYARD, STANDA, itab Institut de l'Agriculture et de l'Alimentation biologiques, ACTALIA, SLU Swedish University of Agricultural Sciences, and MONTS & TERROIRS De merveilleux fromages. At the bottom left, there is a FAIRCHAIN logo and the date 16/11/2021. At the bottom center, it says 'Project overview' and at the bottom right, the number '29'.



Approach

1. Map innovations that could contribute to the development of intermediate food value chains
2. Test in real-life conditions of a minimum of eight innovations through six case studies
 - The six case studies represent a value chain in the fruits, vegetable or dairy sectors involving small and mid-sized actors in a specific territory facing an unsatisfactory situation.
3. Formulate recommendations based on results

Co-creation with multiple food chain actors

Multi-perspective analysis that considers technological, organisational and social innovations

Multi-stakeholder validation



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