

Digital innovation and circular economy ecosystems analysis

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CEI BOOST – Boosting Circular Economy Innovation through emerging technologies application

The CEI BOOST – Boosting Circular Economy Innovation through emerging technologies application project aims to increase the use of digital innovations to support the circular economy. The goal is to enhance the development and implementation of sustainable digital solutions in the circular economy, especially in relation to new technologies, and to ensure that the solutions are used to accelerate the transition to a sustainable circular economy. The countries participating in the project are Bulgaria, Finland, France, Greece, Lithuania, Portugal, Romania, Spain and Sweden.

Digitalization is a wide spectrum, and most people and companies use digital solutions to some extent. However, the degree of use and purpose varies. Digitalization should be looked at as a whole, when

e.g., developing the level of digitalization in the businesses. It would also be beneficial to have a strategic approach.

Common everyday solutions which combine circular economy and digitalization we use are applications and platforms. We have city bikes, online flea markets and apps to purchase surplus lunch. On the bigger scale, our waste goes through a massive waste separation plant, that separates recyclable items from the waste stream with the help of separators, magnets and optical sorters using the state-of-art technology.

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While policymakers are yet to actively link digitalization with wider sustainability efforts when developing policies and financing projects, there is a growing need to align the circular and digital agendas. The Green Deal recognises that circular economy and strong involvement from industry is central to making the EU's economy sustainable.

The CEI Boost project aims at improving policies for easing and speeding up the twin transition to ensure that Green Growth and Digital Transformation go hand in hand to drive regions' recovery and prosperity. The project focuses at enhancing policies conditions in 9 countries for boosting the application of emerging digital innovations to support the growth of circular economy at regional, local or national level, gathering expertise from different regions, different levels' policymakers and leading innovation ecosystems' actors. (CEI Boost 2023)

One of the first activities of the project has been to identify the actors and stakeholders related to both digitalization and the circular economy, and to analyse the current state and maturity of the regions in digitalization and circular economy.

The analyses by the regions highlight potential projects and approaches that have already exploited the potential of digitalization to boost sustainable development and the circular economy in particular.

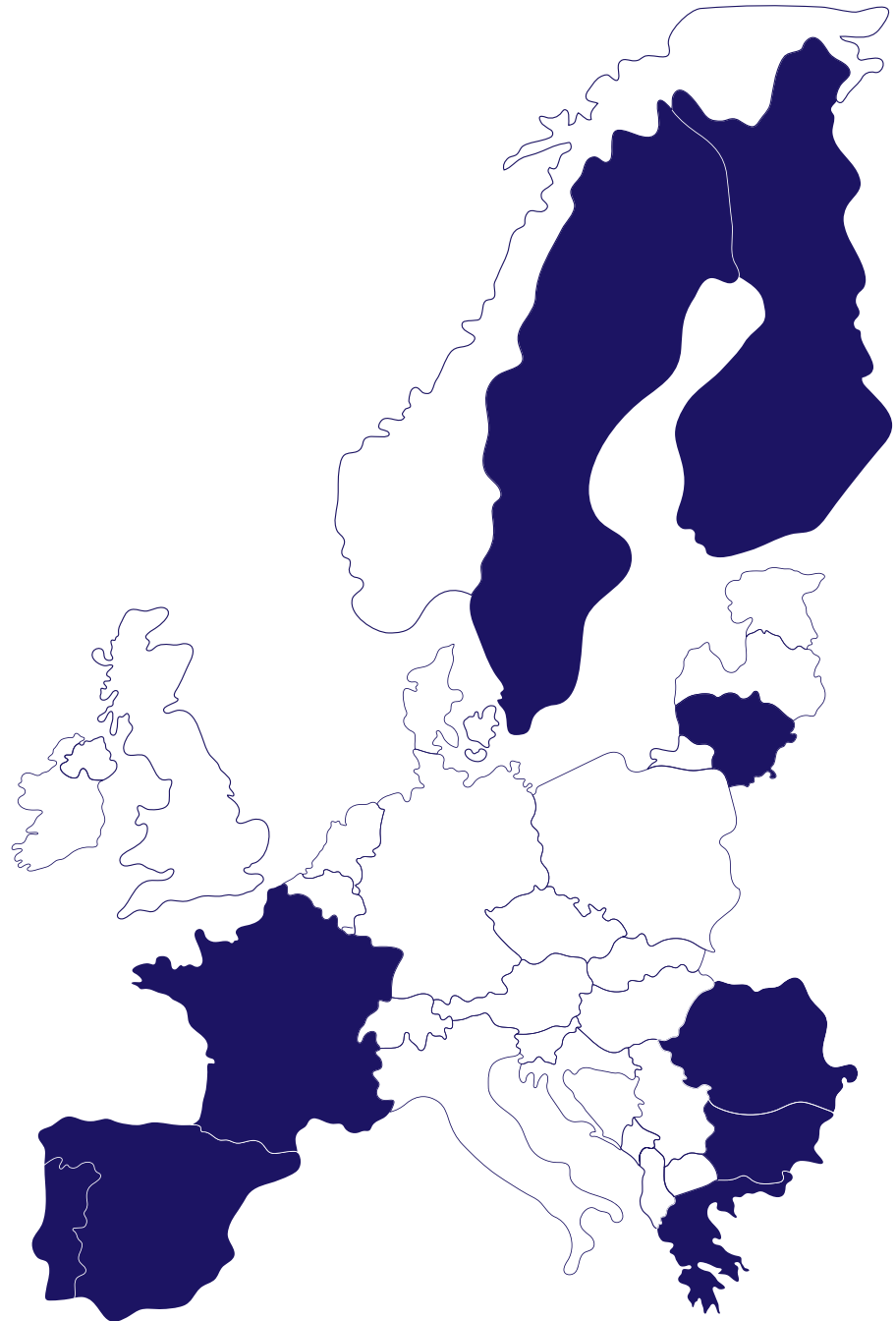
The analysis shows that the level of maturity of the regions in the field of digitalization and circular economy varies, but the general observation is that all the regions included in the analysis have made recent progress and many policies and potential projects are underway and recently initiated. On the other hand, the full potential of digitalization to promote and boost the circular economy has not been exploited.

In conclusion, the analysis carried out confirms the need for policies and development work that uses digitalization in an intelligent, user-driven and justified way to boost the circular economy.

This document analyses the current state of Digital Innovation and Circular Economy in the Region of Päijät-Häme in Finland. The analyses of each partner region and more information of the CEI Boost can be found on the project website: interregeurope.eu/cei-boost

CEI Boost Partners

- Sweden** Region Västerbotten
- Finland** Regional Council of Päijät-Häme
LAB University of Applied Sciences
- Lithuania** Public Institution Lithuanian Innovation Centre
Innovation agency
- Bulgaria** Business Agency Association
- Romania** Institute for Research in Circular Economy
and Environment “Ernest Lupan”
West Regional Development Agency
- Greece** Industrial Systems Institute
- Spain** Tarragona Provincial Council
- Portugal** Business Development Institute of
the Autonomous Region of Madeira
- France** Laval Mayenne Technopole



The Region of Päijät-Häme, Finland

Päijät-Häme is a region of approximately 206,000 inhabitants in southern Finland, with ten municipalities. The region consists of active urban centres and rural areas along with appealing residential areas. Helsinki is one hour away by train or car from Lahti, the central city of the region.

More than a third of the jobs in the region are in social and health services and industry. Industrial companies in Päijät-Häme manufacture furniture, beverages, clothing and drainage pipes, among other things. Additionally, the plastic and sawmill industries as well as environmental technology are strong in the region. Trade and construction are also important employers. (The Regional Council of Päijät-Häme, n.d.)



Digital innovations and digitalization in Päijät-Häme

The Regional Council co-ordinates a four-year strategy for the region and, under the strategy, grants the European Union's regional development funds (ERDF) together with the Häme Centre for Economic Development, Transport and the Environment (Häme ELY Centre).

The Päijät-Häme Regional Strategy 2022-2025 includes the S3 – Smart Specializations Strategy. Renewal and attractiveness are the main priorities of the programme. Renewal in Päijät-Häme means for example that so called “old industries” and old production methods must be renewed to become more sustainable. Attractiveness means actions that promote sustainable and good living for all. Smart specialization spearheads are Sports, Food and beverage and Manufacturing. Sustainability is a cross-cutting principle of the spearheads. (Päijät-Hämeen liitto, 2022.)

Other key development programs as Rural Development Programme for Mainland Finland, Häme countryside development program, Leader-programs, all consider green transition and digitality, but are not the focus of the CEI BOOST project.

Some main actors of the region have their own specific digitalization strategies: Päijät-Häme Education services digital strategy and Digital strategy 2021-2023 Päijät-Sote (Päijät-Häme Joint Authority for Health and Wellbeing).

There are also other key players promoting the business development, including digitalization, as Ladec Lahti Region Development, City of Lahti, LUT University and LAB University of Applied Sciences.

According to Finnish legislation, the role of Universities of Applied Sciences' is to promote regional development. Therefore, LAB University of Applied Sciences works tightly together with Regional Council of Päijät-Häme. LAB University of Applied Sciences is also the lead partner in several of the ERDF funded projects in the Päijät-Häme area, many of them has a focus on digitalization.

These projects are managed by four focus areas of LAB; Design, Circular Economy, Innovation and Health. This indicates that digitalization is relevant and essential for all the fields and industries in Päijät-Häme.

Projects in the region focus on supporting companies in their business activities through digitalization and aim to develop

the digital skills in the businesses. Digitalization also brings with it the need to develop the digital customer experience. The projects in the region can therefore be roughly divided into three broad sub-themes.

1. Increasing digitalization skills in enterprises
2. Creating networks and ecosystems (services and partnerships)
3. Developing digital experience and improving the digital customer experience

Maturity of the digitalization in Päijät-Häme

The maturity of digitalization in the Päijät-Häme region according to research done in 2020 reveals that some of the SME's are only taking their first steps and lagging behind large companies in an industry sector. Lack of resources in personnel and funding were seen as main obstacles on the way towards digitalization. Yet, the research shows that being ahead is not restricted to certain sectors or the size of the company. The differences between maturity levels were defined more in how digitalization has been taken into account in the company, whether it was part of the strategy, how innovative the company culture is and how willing the management is to invest in digitalization. (Holopainen, 2020.)

One of the interesting openings concerning green transition is a Kempower Electric Mobility Research Center (EMRC)

by LUT University and Kempower, which will open up during 2023. The research center focuses on power electronics, mechanics, data and product design, but it also cuts through almost the entire LUT University offering, from technology and economics to social and communication sciences. (LUT 2023a) Furthermore, LUT University has a Software Engineering research area focused on improving practices and software technologies to enhance software and its usability and to develop softwares sustainability. (LUT, 2023b)

Policy instruments for boosting digitalization in the region

Main policy instrument to be considered with the CEI BOOST is **Innovation and Skills in Finland 2021-2027, the European Union regional development fund (ERDF)**. The Regional Council grants the ERDF together with the Häme Centre for Economic Development, Transport and the Environment (Häme ELY Centre). The Regional Council funds RDI sector and business funding is granted by the ELY Centre.

The ERDF program supports research and innovation capabilities, including introduction of advanced technologies, digitalization and improving the growth and competitiveness of SMEs. In addition, Finland's goal of carbon neutrality is promoted, especially from the perspective of energy efficiency, adaptation to climate change and the transition to a circular economy. (Työ- ja elinkeinoministeriö, 2022a.)

The priority area 1 **Innovative Finland** includes following specific objectives which refers to digitalization:

“1.2 Reaping the benefits of **digitalisation** for citizens, companies and public governance: The programme aims to make full use of the business opportunities related to digitalisation, the data economy and technological transitions. The uptake and scaling of RDI results that promote digitalisation are key enablers of business growth.

1.3 Enhancing growth and competitiveness of SMEs: The objective is the resource-smart growth of SMEs in domestic and foreign markets and the renewal of their operations by supporting their capabilities for growth and internationalisation, business competence, **digitalisation**, as well as investments and RDI activities that promote growth, renewal and productivity.” (Työ- ja elinkeinoministeriö, 2022b)

Status of circular economy in the Päijät-Häme region

The Päijät-Häme region’s S3 spearheads are Sports, Food and beverage and Manufacturing as mentioned previously. In the former strategy 2018-2021, circular economy and design were two of the three spearheads, and in the current S3, they are part of the cross-cutting theme, sustainability. (The Regional Council of Päijät-Häme, 2022)

To enhance circular economy in the region, **Päijät-Häme Roadmap Towards Circular Economy**, was launched at the end of year 2017 and it has been updated yearly.

The circular economy roadmap describes the regional vision “the successful resource efficient region in 2030” and concrete measures to achieve common goals.

The roadmap has five main goals:

1. Closed loops of technical streams to create added value
2. Sustainable food systems as a part of bio circular economy
3. Towards energy self-sufficiency by sustainable transport and energy solutions
4. Shared economy generates new consumption models and business opportunities
5. Piloting and demonstrating innovative circular economy solutions.

(Päijät-Häme roadmap towards circular economy, 2021)

Currently, the Regional Council of Päijät-Häme is coordinating the update of two important programs: the Climate Action Roadmap and the above mentioned Päijät-Häme Roadmap Towards Circular Economy. Aim is to merge these two into a Green Transition Program including following sectors: energy, transportation, material cycles, forests and land use & sustainable food system.

The city of Lahti published its own Circular economy roadmap in December 2022. Previously, they set up a resource wise roadmap as part of their environmental program in 2018. (Lahti, 2022.)

The Päijät-Häme region has several circular economy businesses and examples of how to enhance circularity such as the *Grain Cluster*, *Kujala industrial symbiosis*, *Fazer Xylitol* factory.

Projects to support and develop the circular economy have been implemented in the region for several years. The City of Lahti was granted the *European Green Capital 2021* award, which also boosted sustainable development further on. The region is implementing projects both to develop environmental resilience and to build sustainable business. The areas of the recent projects can be categorised in three sectors:

1. Promoting material solutions, resource efficiency and waste reduction
2. Building and developing ecosystems and clusters
3. Supporting the behaviour change

Policy instruments for boosting circular economy in the region

Main policy instrument to be considered with CEI BOOST is Innovation and Skills in Finland 2021-2027, the European Union regional development fund (ERDF), as mentioned in the digitalization part. The ERDF program's priority area 2 Carbon neutral Finland has following specific objective to promote circular economy.

“2.3 Promoting the transition to a circular economy:

A carbon-neutral circular economy reduces material waste, emissions and needs for transport, improves the competitiveness of companies, and addresses the needs of consumers. The sustainable and economical use of natural resources and the promotion of material efficiency in various production processes, from energy production to the mining industry and in the operations of the public sector, are key objectives of the circular economy.” (Työ- ja elinkeinoministeriö, 2022b.)

Digitalization boosting circular economy

It has been noted on a national level report, that the circular economy, digitalization and especially the combination of these are in the initial stage. Finland has strong know-how in the circular economy and digitalization, but the lack of

experts who can master both areas slows down development. Circular economy solutions are still poorly scalable in circular economy business because cooperation between companies and industries is low and siloed. The challenges for the digitalization of the circular economy are due to business models, fragmentation of systems and data, ownership of information, data sharing and integration, collaboration, and skill requirements. (Työ- ja elinkeinoministeriö, 2022c.)

Hence the Finnish examples of digital solutions promoting circular economy and sustainability are so far mainly applications that enable, for example, the reuse of products or sustainable mobility or sharing and renting – such as library services, clothing rental services or bicycle rental services. In addition, platforms have been developed for minimizing the food waste or selling other products.

In Finland, the above models are being implemented irrespective of geographical area. Also, in the Päijät-Häme region, where there is, for example, an advanced electric bicycle sharing service and a local clothing manufacturer's resale service for used products. Finland is a small country in terms of population and markets, despite its geography, and as a result we need national services, delivered in different regions. Such scaled models can also be found in our region – for example Emmy, which sells second hand clothes, has several collection points in Päijät-Häme, or Skipperi, which provides a boat rental and loan service, also operates in Päijät-Häme for the joy of boaters who don't want to own their own boats. All such business models are based on a good and easy-to-use digital service.

From the industry perspective, manufacturing and construction & real estate are strong sectors in Päijät-Häme, which allow great potential for circular economy and for digital solutions. These were also noted in the report of Circular Economy in Kanta- and Päijät-Häme, accordingly the top four relevant sectors for circular economy are primary production, real estate, services and manufacturing. (FCG Suunnittelu ja tekniikka Oy, 2019; Reyes & Rosberg-Airaksinen, 2023.)

Regardless the industry to promote circularity and sustainability, digital services should be developed in a customer-oriented and holistic way. User understanding and good design can influence consumer choices and behaviour.

Stakeholders of digitalization

Companies

- [CGI](#)
- [Evitec](#)
- [Fellowmind](#)
- [Flow Catalyst](#)
- [Infocloud](#)
- [Innotec](#)
- [Kuuki Technology](#)
- [Solita](#)
- [Sympa Lahti](#)

Policy makers

- [City of Lahti](#)
- [Regional Council of Päijät Häme](#)

Academia

- [LAB University of Applied Sciences](#)
- [LUT University](#)

Other organizations and associations

- [LADEC](#)

Stakeholders of circular economy

Companies

- [Carbonaide](#)
- [Fazer](#)
- [Hartwall](#)
- [Labio](#)
- [Lahti Energia](#)
- [Makron](#)
- [Muovipoli](#)
- [Rakennusbetoni ja elementti](#)
- [Salpakierto](#)
- [Stora Enso](#)
- [UPM](#)
- [Wipak](#)

Policy makers

- [City of Heinola](#)
- [City of Lahti Regional Council of Päijät Häme](#)

Academia

- [LAB University of Applied Sciences](#)
- [LUT University](#)

Other organizations and associations

- [Kierrätyskeskus patina](#)
- [LADEC](#)
- [Painovoima ry](#)

Stakeholders boosting circular economy with digitalization

Companies & other good examples

- [eChargie](#)
- [Kempower](#)
- [Lahti Energia: Reiot smart property condition monitoring service](#)
- [Luhta: Luhta ReUse](#)
- [Mankeli bikes](#)
- [Materiaalitori](#)
- [Salpakierto](#)
- [Policy makers](#)
- [City of Lahti](#)
- [Regional Council of Päijät Häme](#)

Academia

- [LAB University of Applied Sciences](#)
- [LUT University](#)

Other organizations and associations

- [LADEC](#)

Summary

Sustainability and digitalization are seen as self-evident parts of strategies and are cross-cutting themes, yet both have developed more on their own, not together. Several companies and projects boost digitalization and circular economy, but there is room for development which would combine both areas. Perhaps the evolution has been so fast that they have taken their own paths and the era of digitalization to accelerate the circular economy is coming next.

According to the report “Circular Economy in Kanta- and Päijät-Häme” companies are increasingly prioritizing the adoption of circular economy principles. The companies interviewed for the report shared their own initiatives towards material circularity and have set sustainability goals as part of their long-term objectives. Further, educational institutions in Kanta- and Päijät-Häme have played a role by providing a wide range of experts and engaging students in active circular economy projects. The circular economy networks are extensive and involve all actors, including consumers, companies, educational institutions, and municipalities.” (Reyes & Rosberg-Airaksinen, 2023.)

Businesses are also influenced by consumers, who are increasingly aware of environmental responsibility and have higher expectations of environmentally responsible alternatives to consume. Therefore in the future, businesses must respond to consumer needs and values also in terms of sustainability. Businesses are required to evolve, and to improve their operations in order to have a larger impact on changing consumer behaviour and the impact they generate.

To move towards circularity and sustainable lifestyles, we should consider all available tools. There is a need for strategies and steering methods, but also for practical solutions like circularity and digitalization. One notable topic is the customer- and user-oriented circular design, how do we develop and promote circular solutions which really take the users into account.

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