Circular textile ecosystem: Drivers and barriers of textile circulation

CICAT ⧐2025

Master's Thesis study

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SUOMEN AKATEMIA

Tampereen yliopisto

UNIVERSITY OF EASTERN FINLAND

JYVÄSKYLÄN YLIOPISTO
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- Conclusion

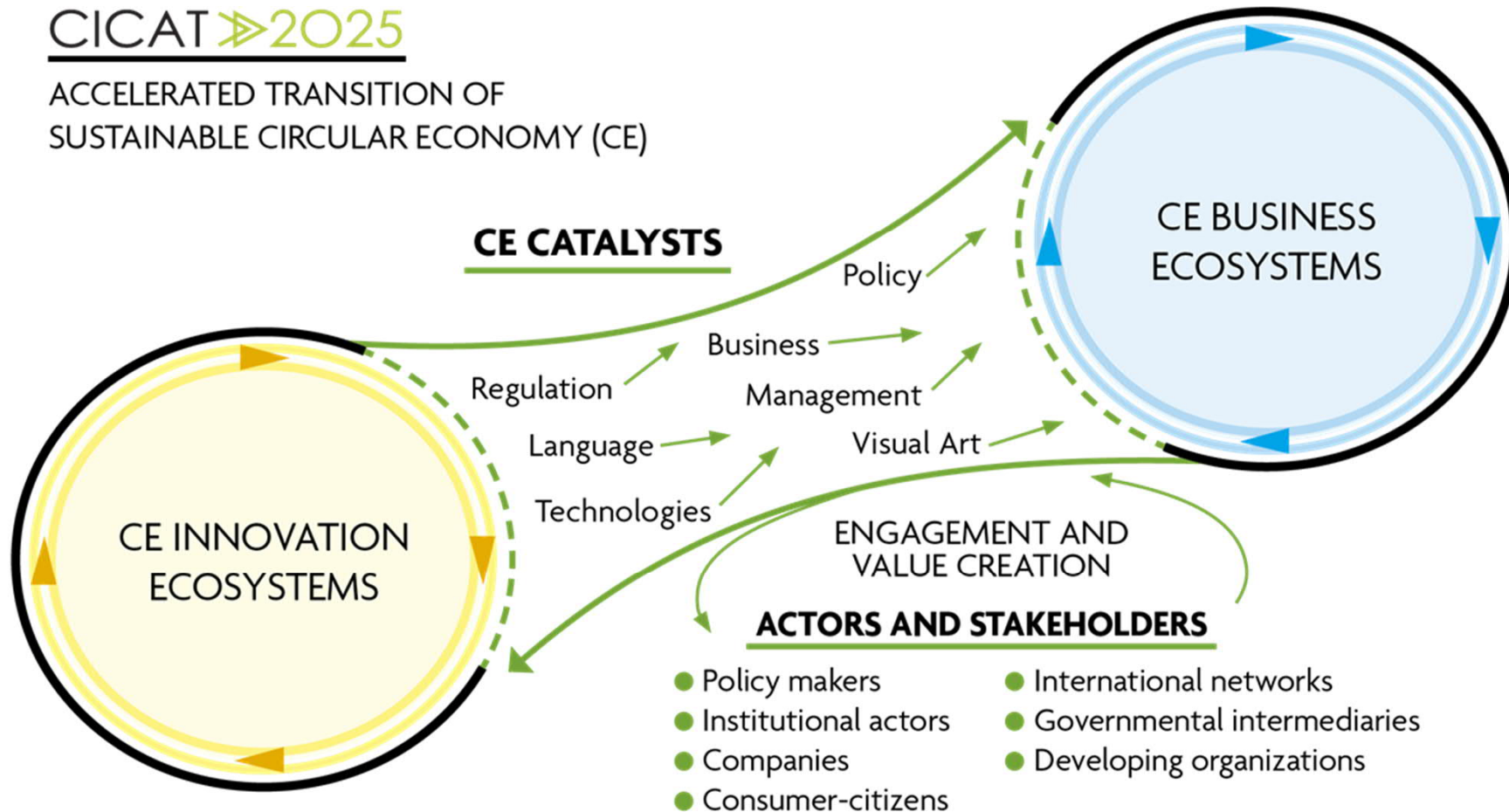strateginen TUTKIMUS   SUOMEN AKATEMIA   CICAT≫2025   30.4.2020   2

CICAT2025

- Circular Economy Catalysts: From Innovation to Business Ecosystems (CICAT2025)
  - Facilitating the transition from linear to circular economy
  - Focus on positive circular economy catalysts that enable and support change

- Joint project of six Finnish universities

- Duration 1.1.2019 – 31.12.2023

- Funding from Strategic Research Council by the Academy of Finland

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ACCELERATED TRANSITION OF
SUSTAINABLE CIRCULAR ECONOMY (CE)

CE CATALYSTS

CE BUSINESS
ECOSYSTEMS

Policy

Business

Regulation

Management

CE INNOVATION
ECOSYSTEMS

Language

Visual Art

Technologies

ENGAGEMENT AND
VALUE CREATION

ACTORS AND STAKEHOLDERS

- Policy makers
- Institutional actors
- Companies
- Consumer-citizens

- International networks
- Governmental intermediaries
- Developing organizations

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Ecosystem approach

- Ecosystem can consist of multiple networks, involving a diverse range of companies, individuals, institutions and technologies that co-evolve and share interdependencies throughout the ecosystem's life cycle

- Ecosystem of textile circulation: actors, whose operations involve circular economy of textiles (reuse, recycling, research, services, ...) + related stakeholders
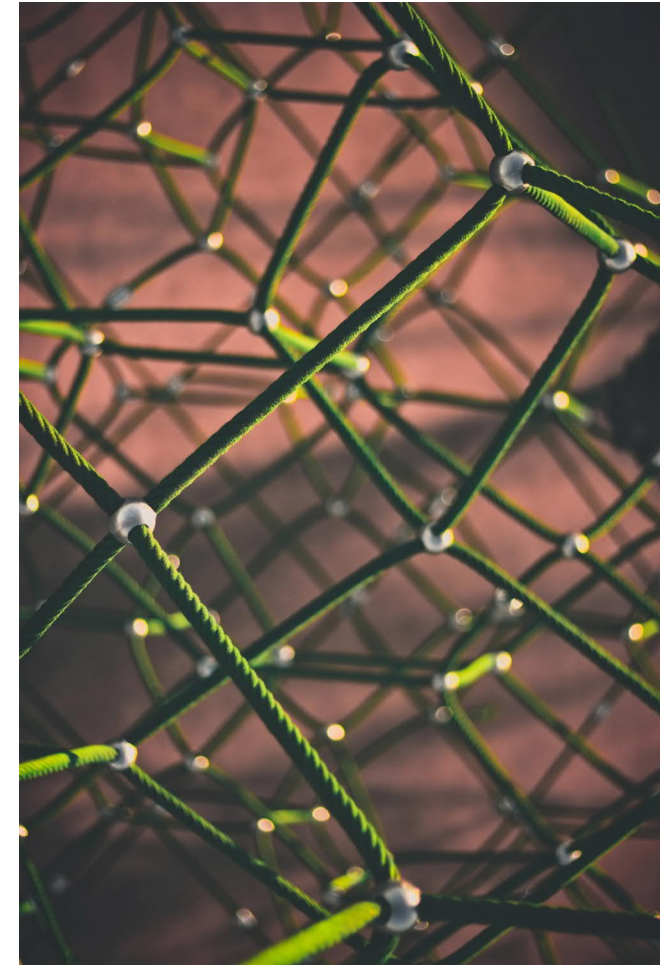

Photo by Clint Adair on Unsplash

Aim of the study

- Research questions:
  - RQ1: What is the current composition and structure of Finland's textile circulation ecosystem and what kind of operations are being performed within it?

  - RQ2: Which technologies are currently enabling textile circulation in Finland?

  - RQ3: Which drivers and barriers within Finnish textile circulation ecosystem either accelerate or decelerate the transition towards a circular textile industry?
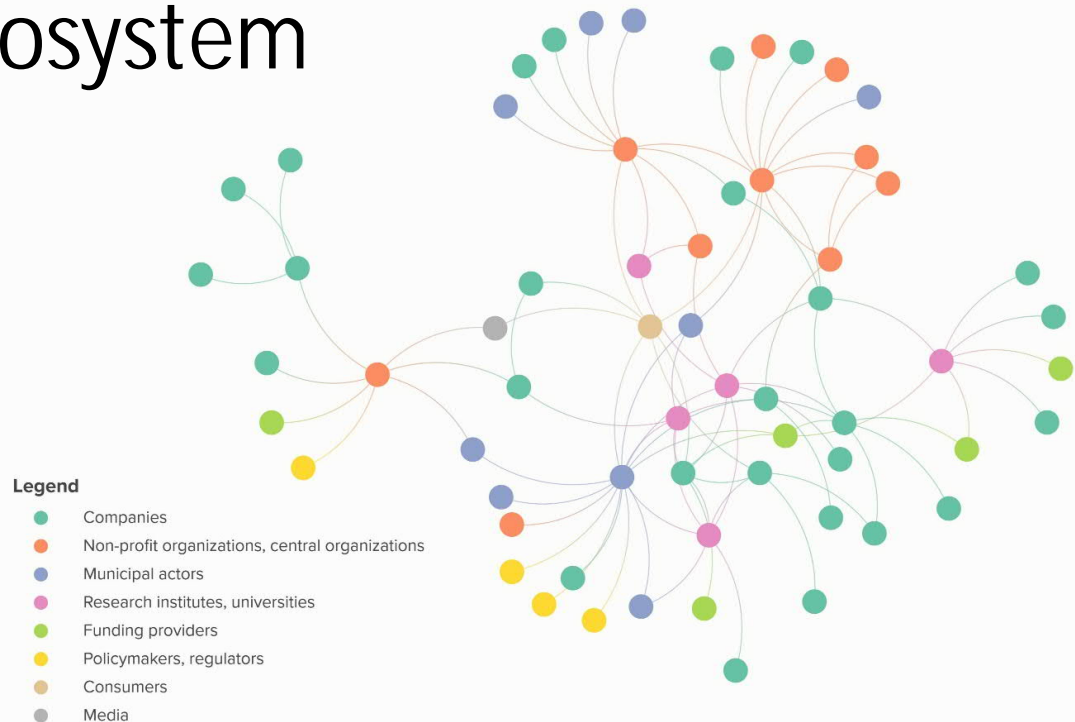
Interviewed ecosystem actors

Interviewed actor	Representative	Date
Pirkanmaan Kierrätys ja Työtoiminta Ry: Nextiili textile workshop	Helena Käppi	05/2019
Southwest Finland Waste Management	Sini Ilmonen	06/2019
UFF	Maija Makkonen & Jari Töyrynen	06/2019
Finlayson	Elli Ojala	06/2019
Finnish Textile & Fashion	Satumaija Mäki	07/2019
Turku University of Applied Sciences	Inka Mäkiö	07/2019
Aalto University	Marja Rissanen	07/2019
Vaatepuu	Soile-Maria Linnemäki	07/2019
Lahti University of Applied Sciences	Kirsti Cura	08/2019
Pure Waste	Noora Alhainen	08/2019
Infinited Fiber Company	Ali Harlin	08/2019
VTT	Pirjo Heikkilä	09/2019

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Actor types within the ecosystem

- Versatile ecosystem: companies, non-profit and central organizations, municipal actors, research institutes and universities, policy makers, funding providers, consumers, media...

- Current focus on research and technology development, reuse market and raw material processing

Legend
- Companies
- Non-profit organizations, central organizations
- Municipal actors
- Research institutes, universities
- Funding providers
- Policymakers, regulators
- Consumers
- Media

Example: Ecosystem's actor type visualization based on interviewees and their addressed stakeholders.

Technologies as textile circulation enablers

- Technologies for textiles' collection phase:
  - moisture meters and fill meters for collection boxes
  - standardized collection bag to prevent internal and external contaminants from spoiling the batch

- Identification and sorting technologies:
  - NIR spectroscopy → suitable material fractions for recycling
  - RFID tags → better traceability
  - automation of feeding and sorting

Technologies as textile circulation enablers

- <u>Recycling technologies</u>:
  - mechanical recycling → yarn manufacturing, composites, pre-process for other recycling methods
  - chemical recycling (Ioncell™ and Infinited Fiber technologies) → high-quality regenerated cellulose fibres

- <u>Digital solutions</u>:
  - product passport → data availability
  - online rental and lending platforms
  - virtual fitting → less pointless deliveries

Photo by Jean-Philippe Delberghe on Unsplash

Business drivers

- Media coverage → conscious consumers' demand for more sustainable products

- Utilizers for opened textile fibres also from outside the textile industry

- Collaborative projects → combining expertise and finding synergies, credibility for funding

- Close customer relations and actions based on customer feedback

Business barriers

- Low price of virgin textile fibres (recycled fibres less likely to compete)

- Long distances and fragmented population complicating service provisioning

- Lack of funding for novel innovations' commercialization phase

Organizational drivers

- Aware administration →
  strategic choice of research topics
  and projects)

- Innovation culture and curious,
  ideological staff

- Cross-consortium communication, communication between research
  groups

Photo by Volodymyr Hryshchenko on Unsplash

Organizational barriers

- Finnish, withdrawn corporate culture

- Companies' uncertainties about what information can be shared and with whom

- Lack of textile technology education in Finland

Regulatory drivers

- Obligation for the separate collection of textiles (EU level)
  - Implementing the separate collection in clear phases with common practices

- Standardized quality grades for opened textile raw material (purity, content)

- Circularity-favouring taxation (e.g. lower VAT for services or recycled material content)

Regulatory barriers

- Recycling percentages (EU level, yet to be decided)

- Giving the waste status to collected textiles prior to sorting

- Challenges of regulating circular product design (differences in e.g. recyclability)

Linguistic drivers

- Common terminology

- Elaborating the full spectrum of circular economy - not just recycling

- Critical evaluation of terms and the mental images they evoke

- Active discussion
  - media coverage, workshops, seminars, public speeches

Linguistic barriers

- Annoyance due to the repetition of sustainability related trend words (responsibility, circular economy, …)

Photo by Brett Jordan on Unsplash

- Differences in perceiving certain terms (e.g. recycling – consumers vs. actors within the industry)
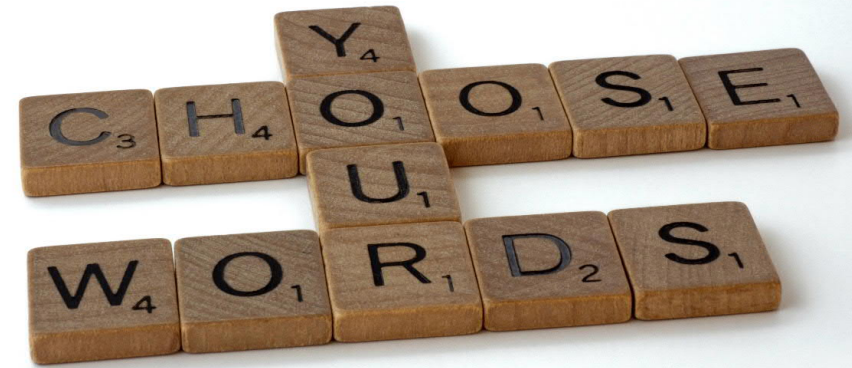
- Using too complex terminology in a general discussion

Visual drivers

- Clarifying technical processes with visuals (e.g. videos, infographs)
  - Utilizing visuals to reach people who are not interested in technical details

- Concretization of large amounts (e.g. saved natural resources)

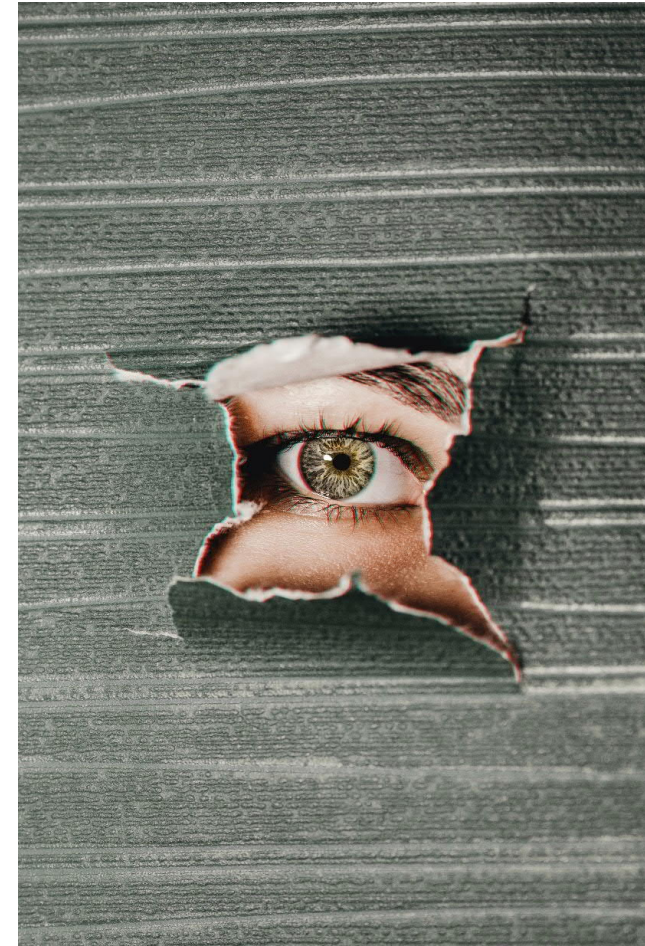- Second-hand stores' and clothing libraries' fresh looks

Photo by Jonathan Borba on Unsplash

Visual barriers

- Creating unified symbols for the global market

- Stereotypes of eco-fashion

- Judgement of donated clothes' looks being blurred by sentimental value

- Without interesting visuals information is less likely to be read and shared

Psychological drivers

- Awareness and goodwill →
  company's strong values attracting
  motivated employees

- Feeding people's attraction for novelty
  in a more sustainable manner
  (e.g. clothing libraries, adaptable products)

- Common goal in a project

- Trust between actors
  - Meeting project partners face-to-face, shared workshops and field trips

Photo by Elena Mozhvilo on Unsplash

Psychological barriers

- Consumers who are not personally interested in sustainability

- Preconceptions concerning recycled materials and used products

- Consumers' suspicions concerning the fate of collected textiles → heated public discussion and misunderstandings

Conclusion

- One driver alone can be a strong driving force, but often a wide spectrum of simultaneous drivers is needed for a change to occur

- Strong need for interdisciplinary approach and expertise

Thank you!

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Thesis:
Towards a circular textile ecosystem: Drivers and barriers of national textile circulation

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