

Lez. 1.1 - CIRCULAR ECONOMY: THE FUNDAMENTALS



Topics

- ▶ Understanding Circular Economy
- ▶ Design frameworks
- ▶ Business models in Circular Economy



Why do we need Circular Economy?

- ▶ In the past, many bakeries have asked the owners of Handelek, is it worth collecting stale bread and turning it into flour?

After all, it's cheaper to use fresh flour.

A photograph of various recycled materials including a piece of white bread, a green paper cup, a blue bottle cap, and a clear plastic bottle.

- ▶ Now, in the era of rising food prices and limited grain supplies caused by the climate crisis and the war in Ukraine, no one asks whether it is profitable. Reusing unsold food is no longer an eco-trend, but a necessity

Ewa Jarosz, **Rebread**

A photograph of various recycled materials including a piece of white bread, a green paper cup, a blue bottle cap, and a clear plastic bottle.

We use too much...

- ▶ **Humanity** is using up more resources than our planet can regenerate

An infographic titled "The number of Earths we'd need" showing the number of Earths required for different countries. The data is as follows:

Country	Number of Earths
US	5
Australia	4.1
Germany	3
Brazil	1.7
India	0.7
Global Average	1.75

Source: Global Footprint Network ©2019

# Progetto L2C – Modulo I

Prof. Simla

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...and we waste too much!

In Europe, the average car sits unused 92% of the time  
(Ellen MacArthur Foundation, Growth Within Report [2015])



Every second, 1 truck full of clothes ends up in a landfill or incinerator  
(Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future [2017])



Linear economy is a road to nowhere



- Limitation of natural raw materials and resources
- Overconsumption and waste
- Problem with waste management
- Rising costs of waste management
- Environmental pollution

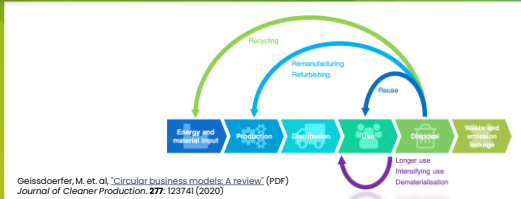
Defining Circular Economy

- Circular economy is a model of production and consumption that involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible. In this way, the life cycle of products is extended

\* European Parliament, "Circular economy: definition, importance and benefits" | News | European Parliament. www.europa.europa.eu. (2015)

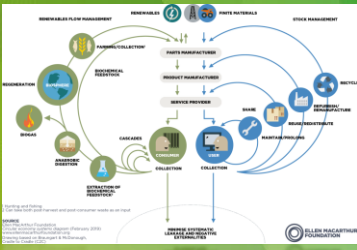
**ELIMINATE      CIRCULATE      REGENERATE**

A Circular model vs Linear model



Geissdoerfer, M. et al. "Circular business models: A review" (PDF) Journal of Cleaner Production. 277: 123741 (2020)

The "butterfly" metaphor of circular economy



© Ellen MacArthur Foundation


Refuse	Smarter product use and manufacturing	01	Refuse	Make product redundant by abandoning its function or having the same function with a radically different product
Reduce		02	Reduce	Use product more intensively (sharing)
Reuse		03	Reuse	Increase efficiency of product manufacture or use by consuming fewer natural resources and materials
Repair	Extend lifespan of product and its parts	04	Repair	Reuse by another consumer of discarded product that is still in good condition and maintains its original function
Refurbish		05	Refurbish	Repair and maintenance of defective product so it can be used with its original function
Remanufacture		06	Remanufacture	Bring an old product up to date
Repurpose		07	Repurpose	Use parts of discarded product in a new product with the same function
Recycle		08	Recycle	Use parts of discarded product in a new product with a different function
Recover	Useful application of materials	09	Recover	Process materials to obtain the same (high grade) or lower (lower grade) quality
		10	Recover	Incineration of materials with energy recovery

The 9R Framework (adapted from Pottier et al., Circular Economy: Measuring Innovation in the Policy Report, PIR Working Paper 2017-01, The Hague [2017], p.6)

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**Review Questions**

- Why do we need circular economy?
- What is circular economy, and how does it differ from the traditional linear economy?
- Which of the 9Rs can SMEs introduce to become more circular?



## DESIGN FRAMEWORKS




- Eco-Design**
  - Design principle that calls for the minimization of negative environmental and health impacts across a product or service's life cycle
- Life Cycle**
  - All of the stages that a product goes through in its lifetime: raw material extraction, processing, manufacturing, use, end-of-life and transportation
- End-of-Life**
  - The life cycle stage during which a product no longer has value to its original owner and is then disposed of
- Lifetime Extension**
  - Product characteristics that lengthen the time over which that product continues to serve its originally intended function

- Cradle-to-Cradle**
  - A design framework focused on "eco-effectiveness" and positive impact of the product while reducing the negative impacts.
- Cradle-To-Birth**
  - An LCA (Life cycle assessment) that evaluates the environmental impacts of a product or process from raw material extraction through manufacturing
- Cradle-To-Grave**
  - An LCA that evaluates the environmental impacts of a product or process from raw material extraction up through disposal.

**Review Questions**

- What is a lifetime extension?
- What is a cradle-to-cradle design framework?



## BUSINESS MODELS IN CIRCULAR ECONOMY



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- Circular inputs**
  - In a circular economy, renewable, recycled, or highly recyclable inputs are used in production processes—enabling partial or total elimination of waste and pollution
- Sharing Model**
  - A business model based on the sharing of underused assets as a service
- End-of-Life**
  - The outcomes produced by a product are sold, rather than the product itself. Products are offered in subscription models that are offered with services attached
- Product use/life extension**
  - Designing products to last longer and to be used over several use cycles for reparability, upgradability, reusability, ease of disassembly, reconditioning, and recyclability of all components
- Resource recovery/Design for recycling**
  - Redesign of products and manufacturing processes to maximize recoverability of the materials involved for use in new products

#### Benefits of implementing circular economy

- Improved resilience of economic systems
- Cost savings, New sources of innovation and revenue
- Preserved natural capital and climate change mitigation
- Economic growth and employment
- Improved customer relationship

ISS 8001: 2017, Framework for implementing the principles of the circular economy in organizations

#### Review Questions

- ▶ What are the benefits of changing business model to circular ones?
- ▶ Can you think of one PaaS example from your everyday life?

## SUMMARY

## REVIEW QUESTIONS

- ▶ Why do we need circular economy?
- ▶ What is circular economy, and how does it differ from the traditional linear economy?
- ▶ Which of the 9Rs can SMEs introduce to become more circular?
- ▶ What is a lifetime extension?

- ▶ What is a cradle-to-cradle design framework?
- ▶ What are the benefits of changing business model to circular ones?
- ▶ Can you think of one PaaS example from your everyday life?

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