
# Business and innovation opportunities of circular economy and industry 4.0

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**Legambiente** is a non-profit leading environmental organisation in Italy that works for the safeguarding and enhancement of natural resources; environment; common health; animal and plant species; historical, artistic and cultural heritage; territories and landscapes. It is formed by 20 regional committees and more than 2000 local groups. Since its foundation in 1980, Legambiente's hallmark is the **scientific environmentalism**, which is the willingness to build every environmental protection project on a solid base made of scientific data.

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**University of Padova** - Laboratory of evolution of italian manufactoring with digital innovation - In 2017 the university studied the strategy of italian PMI for showing motivations, advantages e difficulties in investments.

The Lab of University are studing the results of the link of enviromental sustainability and industry 4.0

# Can we change? Please…

# **Circular Economy:** Characteristics

- New path of innovation
- Overcoming sector limits
- Changing of the role of companies between provider and client
- Active user
- New jobs skills
- From quantity to quality, but with measurement

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# Circular Economy and Industry 4.0

Fewer resources

New relations in economic chain

**Industry 4.0**

Tracking system

Collaborative innovation

**New business models**

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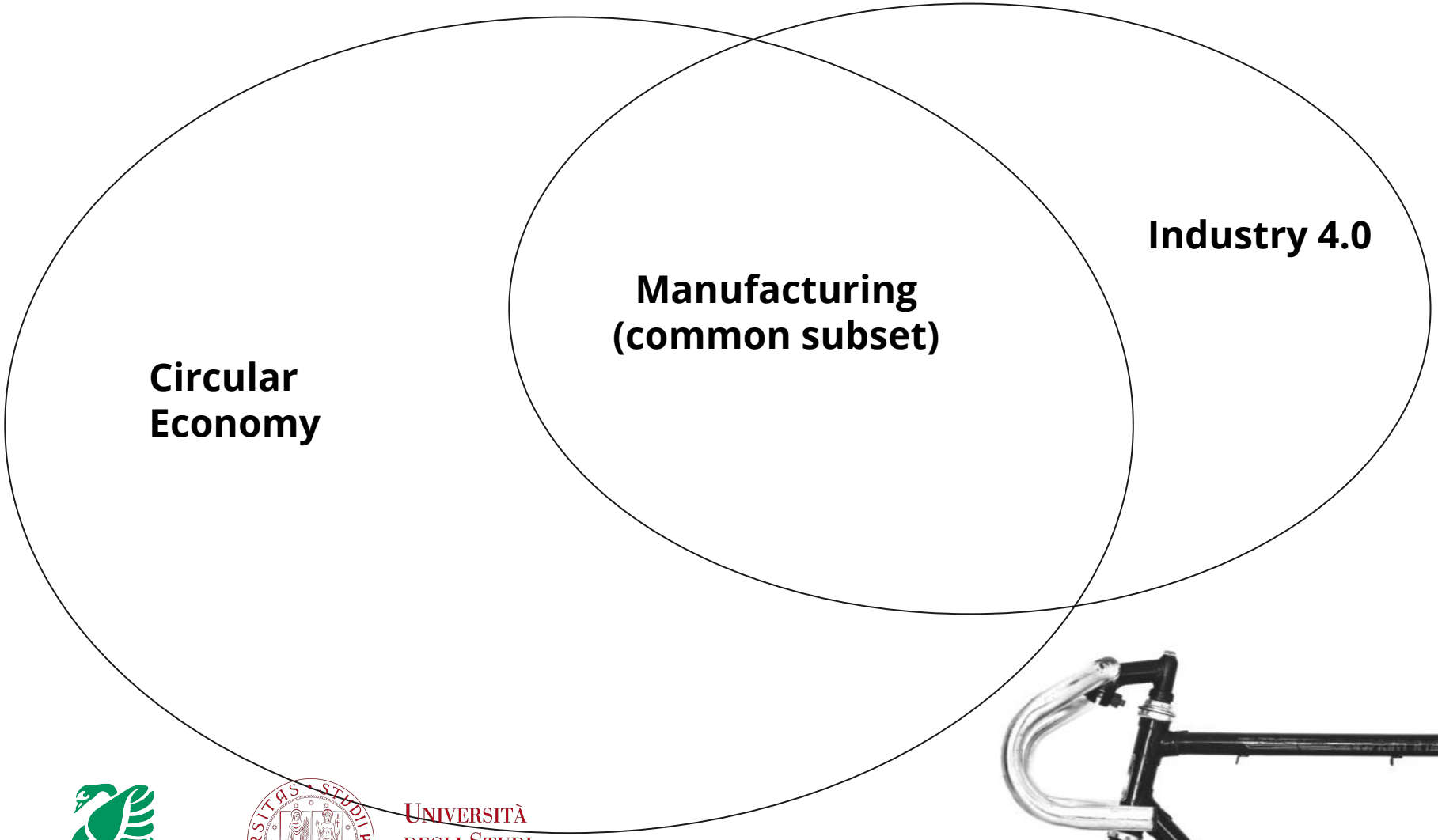
# Manufacturing

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# Goals of the study

University of Padova and Legambiente will look for links between circular economy and industry 4.0

- WHO?
  Knowing the profile of companies and the business model that practise circular economy
- WHY?
  Motivations, difficulties and risks of process
- HOW?
  New relations and investments in Industry 4.0 and in Circular Economy

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# Method

- 231 selected manufacturing companies that practise Circular economy (small and medium-sized enterprises)

- Treno Verde of Legambiente
- “100 Storie” of Circular Economy (Enel / Symbola)
- ReMadeinItaly
- MAINN Legambiente (Innovative materials for buildings)

- Quantitative Method: Computer-assisted web interviewing (CAWI) to manager and leader of environmental policies

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# Companies and Business Model

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# Companies

| | |
|---|---|
| **Workers (average 2017)** | 67 total workers<br>43,5 in production<br>2,4 in research and development<br>2,4 in marketing |
| **Export rate (average 2017)** | 10,3% (9,4% first market) |
| **Investment in R&D (rate turnover)** | 12,9% |
| **Investment in Circular Economy (rate turnover)** | 42,3% |
| **Starting year of Circular Econony** | 2010 |
| **Core business** | 58,0 % B2C - 34,3% B2B (7,7% PA) |
| **Location of production** | 74,2% same district<br>19,9% Italy<br>5,9 % foreign |

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# Practical Circular Economy

| | |
|---|---|
| Prevention and reduction of waste, | 88 |
| Reduction in the use of resources. | 62 |
| Re-use of waste of production | 54 |
| Reduction of negative emissions | 50 |
| Use of secondary raw materials and waste materials | 46 |
| Re-use of waste materials by other companies | 44 |
| Use of renewable raw materials | 42 |
| Improvement of products durability | 40 |
| Possibility to repair/reuse own products | 34 |

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# Circularity input and output

| | |
|---|---|
| % Recycling materials | 31,7 |
| % Renewable materials | 29,9 |
| % Materials for reuse | 19,6 |
| % Non-renewable materials | 18,8 |

**INPUT FOR PRODUCTION (total 100%)**

**OUTPUT BY PRODUCTION (total 100%)**

| | |
|---|---|
| % Sent for recycling | 56,9 |
| % Sent for re-use | 23,6 |
| % Sent directly to waste | 20 |

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# Sustainability of energy sources

| | |
|---|---|
| % from fossil fuels | 64,2 |
| % from renewable sources | 21,0 |
| % self-produced | 14,8 |

**Electric Energy as input of the production process (tot. 100%)**

**Thermal Energy as input of the production process (tot. 100%)**

| | |
|---|---|
| % from fossil fuels | 76,8 |
| % from renewable sources | 13,8 |
| % self-produced (cogeneration/waste) | 9,3 |

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# Circularity and business process design

| | |
|---|---|
| Marketing and commercial activities | 61,7 |
| New products (R&D) | 47,9 |
| New products (production) | 47,9 |
| Logistic and Supply chain management | 42,5 |
| Production | 36,2 |
| Management and after sales services | 31,9 |
| Products portfolio management | 27,1 |

**Answers with % (much , and very much)**
**From 1 to 5**

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# Measuring circularity

| | |
|---|---|
| Providing environmental certification of products | 53,2 |
| Providing environmental certification of processes | 53,2 |
| Having a regular monitoring system of circularity in place | 38,3 |
| Drawing up a sustainability budget | 27,7 |
| Providing B-CORP certification of the company (or under revision) | 10,6 |

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# Motivation and results

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# Motivations

| | |
|---|---|
| Improving business ethics and social responsibility | 89,6 |
| Increasing  the products portfolio value | 81,2 |
| Entering new markets (GPP, Export, new market segments) | 68,8 |
| Improving the competitiveness of existing markets | 58,3 |
| Growing interest of consumers and clients | 56,2 |
| Adapting to existing/future regulation | 41,7 |
| Satisfying demands from big buyers/clients | 41,7 |
| Reducing production costs | 37,5 |
| Claiming tax concessions and reliefs | 16,7 |
| Adapting to competition in the industry | 12,5 |

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# Goals

| | |
|---|---|
| Improved company reputation | 87,6 |
| Improved motivation/business mission | 68,8 |
| Brand repositioning | 68,8 |
| Increased variety of products/services | 66,6 |
| Access to new markets | 48.9 |
| Increased market share | 46,8 |
| Costs reduction | 44,7 |
| More stable cost structure | 36,2 |
| Adaptation to competion | 12,8 |
| Easier access to credit | 8,5 |

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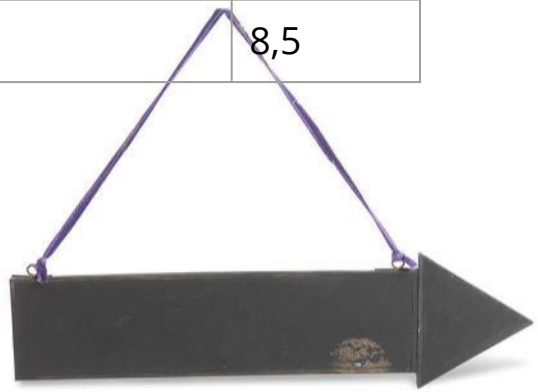

# Difficulties

| | |
|---|---|
| Inadequate/Contradictory legislation | 48,9 |
| Increased price of products/services | 48,9 |
| Lack of adequate funding | 42,5 |
| Lack of knowledge | 39,6 |
| Finding adequate distribution channels | 38,3 |
| Uncertainty in future returns | 37,5 |
| Supplementary implementations costs | 33,3 |
| Finding adequate suppliers | 31,1 |
| Technological limitations | 26,1 |
| Quality and efficiency of circular products/services | 25 |
| Lack of competencies inside the company | 19.1 |

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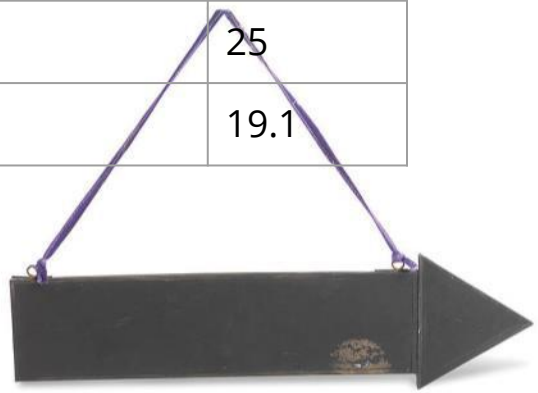

# Impact of jobs of circular economy

| | |
|---|---|
| **STABLE** | 43,8% |
| **INCREASE** | 52,0% |
| **DECREASE** | 4,2% |

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# Impact of jobs (part2)

| | |
|---|---|
| Acquisition of new technical professional roles | 39,6 |
| Employee skills update (administration and management department) | 39,6 |
| Employee skills update (technical department) | 39,6 |
| Acquisition of new administrative and managerial professional roles | 8,4 |

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# Relations and collaboration with providers

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# Collaborations for circular economy

| | |
|---|---|
| Materials suppliers | 57,8 |
| Universities and research institutes | 48.9 |
| Consultancy | 31,2 |
| Public administration | 31,1 |
| Nonprofit organisations | 28.9 |
| Machinery and technology suppliers | 26,7 |
| Certification bodies | 26,7 |
| Trade association | 24,5 |

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# Circularity and provider relationship

| | |
|---|---|
| Added new circular suppliers to existing ones | 50 |
| Adjustment of existing suppliers to business requests for circularity | 36 |
| Shortening of the supply chain | 34 |
| Actions to raise awareness / help existing suppliers | 32 |
| Replacement of existing suppliers with new circular suppliers | 24 |
| Involvement of circular suppliers from different sectors | 20 |
| Request for certification of circularity to suppliers | 18 |
| Supply network has not undergone changes | 16 |

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# Financial resources

| | |
|---|---|
| Self-financed | 80 |
| Bank financing | 38 |
| European financing | 18 |
| Regional financing | 16 |
| Crowdfunding/fundraising | 2 |

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# Industry 4.0

Are you following the Industry 4.0 strategy?

| | |
|---|---|
| Yes | 75% |
| No | 25% |

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# Investment in INDUSTRY 4.0

| | |
|---|---|
| Motivations | Customer service |
| | Internal efficiency |
| | Environmental sustainability |
| Impacts | Ability of monitoring input |
| | Input reduction, adoption of more sustainable input |
| Most relevant technologies for circularity | Big data / Cloud |
| | Additive manufacturing |
| | Internet of things |

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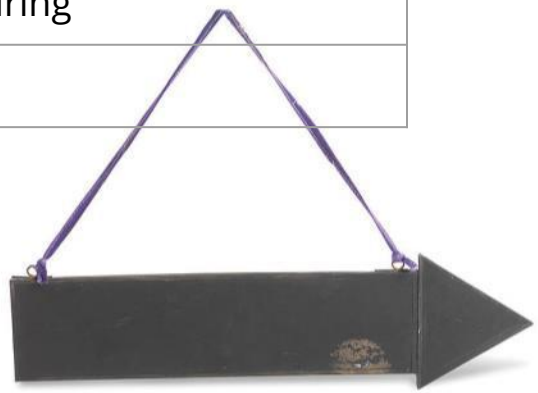

# RESULTS (last three years)

| | |
|---|---|
| Workers | Increased - 58<br>Stable - 40<br>Decreased - 2 |
| Export | Increased - 25<br>Stable - 57<br>Decreased - 18 |
| Market share | Increased - 62<br>Stable - 38<br>Decreased - 0 |
| Return on investment | Increased - 55<br>Stable - 43<br>Decreased - 2 |

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# CONCLUSIONS

• Approach to the proactive circular economy, driven by ethical and market motivations

• Business model focused mainly on efficiency, with shortening and requalification of the supply network

• Main benefits on the reputation front, internal motivation, with positive effects also on employment growth (technical figures) and on performance

• Path carried out autonomously by enterprises (private initiative), with a predominance of own capital and without relying on institutional support (relevance only for scientific and research partners)

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# CONCLUSIONS

Circular economy to be considered as the starting point of a paradigm shift

Can we change? Please...

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# THANKS TO

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# CONTACT ME FOR FURTHER DISCUSSIONS

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