

Motivations, barriers, drivers, and benefits of circular economy in EMAS and ISO 14001 Portuguese companies

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Supplementary Material

Table S1. Questionnaire

Company characterisation:

- Size of the company:
 - Micro (< 10 employees)
 - Small (11 to 50 employees)
 - Medium (51 to 250 employees)
 - Large (>250 employees).
- Company activity sector:
 - Public administration and defence
 - Accommodation and catering activities
 - Consulting, scientific, technical, and similar activities
 - Collection, treatment and distribution of water, sanitation, waste management
 - Wholesale and retail trade
 - Manufacturing industries
 - Production and distribution of electricity, gas, steam, and cold air
 - Transport and storage
 - Other activities: (please define) _____
- Company type:
 - Public
 - Private
 - Other: (please define) _____

What is the level of implementation of the following driving factors of the circular economy in your organisation? (1 – Non-existent, 2 – Low, 3 – Medium, 4 – High, 5 – Very high).

• Adoption of actions for consumers to realise their ecological intentions	①	②	③	④	⑤
• Information technologies usage to improve the circularity of products/services	①	②	③	④	⑤
• Introduction of more sustainable materials in the manufacturing process	①	②	③	④	⑤
• Product warranty extension	①	②	③	④	⑤
• Maintenance, repair, and remanufacturing networks	①	②	③	④	⑤
• Product delivery in recyclable/sustainable packaging material	①	②	③	④	⑤
• Packaging weight reduction	①	②	③	④	⑤
• Sharing distribution networks between companies	①	②	③	④	⑤
• Symbiosis models between companies to reduce the use of materials and/or energy	①	②	③	④	⑤
• Networks between companies for taking back/reusing and/or recycling used products	①	②	③	④	⑤
• Symbiosis models across companies to optimise the use of waste and/or effluents	①	②	③	④	⑤
• Dematerialization of products/services (digitalise and/or virtualise)	①	②	③	④	⑤
• Product as a service (renting/leasing and pooling)	①	②	③	④	⑤

What is the level of the following barriers to implementing circular economy in your organisation? (5 – Non-existent, 4 – Low, 3 – Medium, 2 – High, 1 – Very high)

• Organizational knowledge regarding the circular economy	①	②	③	④	⑤
• Top management support/involvement	①	②	③	④	⑤
• Technological capacity	①	②	③	④	⑤
• Human and material resources	①	②	③	④	⑤
• Employee involvement	①	②	③	④	⑤
• Integration in the supply chain	①	②	③	④	⑤
• Difficulty implementing Cradle to Cradle models	①	②	③	④	⑤
What is the level of the following benefits of adopting CE in your organisation? (1 – Non-existent, 2 – Low, 3 – Medium, 4 – High, 5 – Very high).					
• Production/sale of sustainable products	①	②	③	④	⑤
• Minimization of resource consumption	①	②	③	④	⑤
• Improvement of energy efficiency in the facility	①	②	③	④	⑤
• Adoption of renewable energy sources for internal consumption	①	②	③	④	⑤
• Improved profitability and economic performance	①	②	③	④	⑤
• New business opportunities focused on CE strategies	①	②	③	④	⑤
• Increased synergies with other companies in the supply chain	①	②	③	④	⑤
• Waste/emissions reduction	①	②	③	④	⑤
• Job creation linked to circularity initiatives and CE strategies	①	②	③	④	⑤
• Company image improvement	①	②	③	④	⑤
• Reducing the risk of legal non-compliance	①	②	③	④	⑤
• Improvement of workers' motivation	①	②	③	④	⑤
What is the level of the following motivations of adopting CE in your organisation? (1 – Non-existent, 2 – Low, 3 – Medium, 4 – High, 5 – Very high).					
• Customers' requirements	①	②	③	④	⑤
• Shareholders demands	①	②	③	④	⑤
• Competitors 'practices	①	②	③	④	⑤
• Strategic decisions of top management	①	②	③	④	⑤
• Marketing and image improvement	①	②	③	④	⑤
• The concern in anticipation of competition	①	②	③	④	⑤
• Integrating CE into environmental policy	①	②	③	④	⑤
• The contribution of EMS to sustainable innovation	①	②	③	④	⑤
• Utilisation of the EU Ecolabel Environmental Labelling Scheme	①	②	③	④	⑤
• Green public procurement practices	①	②	③	④	⑤
• Utilisation of building sustainability performance level(s)	①	②	③	④	⑤
• Employment of environmental technology verification	①	②	③	④	⑤
• Product environmental footprint usage	①	②	③	④	⑤
• Organisation environmental footprint usage	①	②	③	④	⑤