

Mastering Circular Production

A CIRCULAR ECONOMY SPECIALISATION PROGRAMME

A specialisation programme designed to equip participants with the knowledge to drive the transition to a sustainable and cleaner production. Existing established production and manufacturing systems are viewed through the lenses of circular economy, and supplemented with modern circular production practices, circular & eco design, sustainable material & resource management, waste prevention and treatment. The transition to circular production is accelerated and capitalized with sustainable & impact investment opportunities, sustainable human behaviour, data analysis of production process and sustainable supply chains.



TARGET AUDIENCE

The programme is designed for professionals across various functions who are committed to driving the transition towards sustainable, cleaner production systems within their organisations. These individuals are eager to pioneer circular economy practices, equipping their teams and businesses with the tools to reduce waste, optimise resource use, and integrate sustainable design and production processes into everyday operations.

More specifically:

- 1. Top & Middle Management:** Executives and managers who seek to drive strategic transformation by embedding circular economy practices into their organisations. They aim to align sustainable production models with long-term business goals, ensuring resilience, resource efficiency, and competitive advantage.
- 2. Production & Design Leaders:** Professionals in research, design, production, and manufacturing who are responsible for implementing circular design principles, optimising production processes, and reducing waste. They focus on integrating sustainable materials, improving product lifecycles, and enhancing resource management.
- 3. Procurement, Quality & Sales Teams:** Key personnel in procurement, quality assurance, and sales who are tasked with aligning supplier practices with circular economy standards, ensuring product quality through sustainable processes, and communicating the environmental and financial benefits of circular products to customers and stakeholders.



DURATION

The program is designed to be completed in 6 months.



PROGRAMME OBJECTIVES

- **Master Circular Production:** Learn practical methods for circular product design, resource and material management, waste prevention, and end-of-life (EOL) strategies, with a focus on circular interventions in production systems.
- **Apply Circular Design:** Gain expertise in integrating circularity into product and service design, considering sustainability, material sourcing, and Life Cycle Assessment (LCA) for qualitative and quantitative evaluation.
- **Manage Sustainable Materials:** Develop skills in recycling, downcycling, and upcycling processes, while ensuring compliance with secondary raw material standards through advanced quality control principles.
- **Transition to Circular Business Models:** Understand the shift from linear to circular business models, explore key concepts like Product-as-a-Service (PaaS) and circular supply chains, and adopt tools for establishing a circular business culture.
- **Implement Sustainable Investment Strategies:** Learn how to secure financing for circular transitions, attract sustainable investment, and apply sustainability reporting for business transformation.



LEARNING OUTCOMES

- **Leverage Data for Circular Innovation:** Apply data analysis and management techniques to optimise circular economy practices, enhancing production efficiency and sustainability reporting.
- **Lead Organisational Change for Circularity:** Use change leadership and agile methodologies to drive successful transitions to circular business models, fostering innovation and resilience.
- **Foster Circular Ecosystem Collaboration:** Build partnerships and networks that promote circular economy principles and create systemic change within and across organisations.
- **Implement Sustainable Production and Materials Management:** Apply circular economy strategies to improve sustainable consumption, production, and materials management, focusing on recycling, downcycling, and upcycling.
- **Enhance Communication and Sustainable Behaviour:** Develop effective internal communication strategies and promote sustainable behaviours that align with organisational goals and boost engagement in circular initiatives.



PROGRAMME STRUCTURE

The program allows participants to choose a minimum number of courses in a specific stream. This allows participants to customise and select the most relevant courses based on their interests and background knowledge.

Therefore, the programme is structured into two parts, mandatory and elective courses.

No.	Mandatory Courses	Level
1	Circular Business Models: Steps from Linear to Circular	Intermediate
2	Sustainable Materials Management - Recycling, Downcycling and Upcycling	Beginner
3	Circular Design and Eco-Design (incl. Cradle to cradle)	Beginner
4	Circular Production	Advanced
5	Sustainable Finance: Apply Sustainable Investment Strategies and Green Finance in Your Company	Advanced

On the next page the list of elective courses is presented, from which the participants should choose at least 2 courses.



PROGRAMME STRUCTURE

No.	Elective Courses	Level
1	Quantitative Data Analysis with SPSS	Beginner
2	Transformation and Change Leadership - How to Navigate Through the Transition Successfully and Inspiringly	Intermediate
3	Collaboration, networking, partnership - Connecting the Dots for Circular Ecosystems	Intermediate
4	Sustainable Consumption and Production	Intermediate
5	Green Up Our (Work) Life: An Introduction to Sustainable Behaviour	Intermediate
6	Sustainable Materials Management - Recycling, down-cycling and upcycling	Intermediate
7	Creating a New Narrative – How to Boost Your Internal Communication Effectively	Intermediate
8	Circular Business Strategies and Innovation	Advanced



APPLIED RESEARCH PROJECTS

INVESTIGATING THE INTEGRATION OF CIRCULAR PRODUCTION PRINCIPALS IN A PRODUCT'S RESOURCE UTILISATION

- **Importance of the Topic**

Integrating circular production principles into a product's production line resource utilisation, is essential for fostering environmental sustainability, economic performance, and resilience in the face of global challenges. Resource efficiency is maximized by promoting recycling, reusing, and repurposing materials, which minimizes waste and reduces raw material consumption. This approach not only lowers companies' environmental footprints—resulting in decreased pollution, greenhouse gas emissions, and ecological degradation—but also brings economic benefits through cost savings and potential new revenue streams from recycling and repurposing. As consumer demand for sustainable products grows, businesses that adopt these practices can enhance their brand reputation and ensure compliance with increasingly stringent waste management regulations. Furthermore, embracing circular principles fosters innovation in product design and business models, improves product longevity by considering their entire life cycle and aligns with corporate social responsibility goals.

- **Research Subject**

The research aims to conduct an analysis of a product's production line to create a detailed resource mapping in terms of materials, energy, and water consumption, identify opportunities for substituting primary raw materials with secondary or recycled ones, and explore the recycling and reuse potential of byproducts. The ultimate goal is to promote strategies that yield the most significant environmental and economic impact.

- **Research Objectives**

1. To analyse the Production Resource Mapping

- **Materials Mapping:**

- Identify and catalogue all primary, secondary raw materials and semi-products used in the production line, including their sources, costs, and supply chain logistics.
- Document all by-products and waste generated during the production process, their quantities, and composition.

- **Energy Consumption Analysis:**

- Measure energy consumption patterns throughout the production process, utilizing existing energy measuring infrastructure, making theoretical estimation based on available data on processes and equipment, or installing smart meters and making energy audits.



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- Water Consumption Mapping:
 - Identify wastewater generation points and treatment methods currently employed.
 - Measure water usage along the production line.
- 2. To research on alternative primary raw materials & Semi-products:
 - Research on the Identification of substitutable materials:
 - Research sustainable secondary raw materials, recycled options, alternative semi-products that can potentially substitute existing production line feedstock
 - Create evaluation criteria to assess potential substitutes based on environmental impact, cost, technical performance, and availability.
 - Analyse technical properties, availability, regulatory compliance, and cost implications of substitutable materials.
- 3. To research on waste & byproduct sustainable management
 - Research on the Recycling and Reuse material potential:
 - Evaluate various options for recycling or reusing these by-products within the same production process or in different industries.
 - Explore existing methodologies or technologies that facilitate the recycling or reuse of specific by-products.

- **Main Hypothesis**

Implementing sustainable production practices positively influences economic benefits, environmental sustainability, innovation and competitive advantage.

- **Special Hypothesis**

Companies applying circular production initiatives reduce costs and generate new revenue streams.



APPLIED RESEARCH PROJECTS

INVESTIGATING THE INTEGRATION OF CIRCULAR PRODUCTION PRINCIPALS IN A PRODUCT'S RESOURCE UTILISATION

- **Expected Scientific Contribution**

The proposed research promotes environmental sustainability through various means. By identifying opportunities to substitute primary raw materials with secondary or recycled materials, it aims to reduce the demand for virgin resources. This shift is expected to lessen environmental degradation and minimize habitat loss. Additionally, recycle and reuse waste & by-products will lead to a decrease in waste directed to landfills, diminish the overall environmental footprint and retain the value of materials in the supply chain. Sustainable material selection combined with improvements in energy and water efficiency, can significantly lower greenhouse gas emissions linked to manufacturing activities. From an economic standpoint, the application of the study, can result in substantial cost savings for companies, particularly in terms of raw material procurement and waste management. As a result, businesses may experience reduced material costs and lower disposal fees. The research also fosters a culture of innovation by promoting the exploration of new practices and technologies in sourcing, processing, and recycling which may lead to enhance production efficiency.

- **Application of the Research Results**

This research can be applied across various sectors including production, manufacturing, food processing, textiles, and electronics, significantly contributing in the sustainability of production processes. The application of the results in an actionable implementation plan can significantly prosper the researched product field by investing in the improvement of an already established production or by incorporating the findings in the circular & eco design of new similar products.

- **Keywords**

Circular Production, Sustainable Resource Management, Waste Prevention, Raw Materials, Secondary Materials, Energy Efficiency, Water Efficiency, Reusing, Recycling.



APPLIED RESEARCH PROJECTS

A COMPREHENSIVE APPROACH FOR CIRCULAR ECONOMY OF RESOURCES USED IN CONSTRUCTION MATERIALS MANUFACTURING

- **Importance of the Topic**

The intensive growth of science, technology and economy, requires the construction companies to improve their production and process management method and to comply with sustainability principles. The research aims to provide a method that be of importance and relevance for a sector among the highest ranked in the profitability, income, built on tin the carbon footprint as well. The improved sustainability performance will contribute to the improved financial performance of construction companies of the explored professional profile, the research will reveal the correlation between the two important benchmarks of a company successful operation.

- **Research Subject**

The research will focus on exploring potential, opportunities, methods and feasibility of implementation of circular economy principles on resources used in construction prefabricated materials and products. The specific of the research will be to develop a comprehensive method for integration and evaluation of technological and economical assessment of recycling, recovery and reuse of production resources.

- **Research Objectives**

- To establish a method of assessment of potential of CE in construction sector branch of manufacturing, more precisely:
- To investigate the technical and technological possibilities of recycling, recovery and reuse of resources in construction manufacture
- To assess the technical feasibility thereof
- To evaluate economic, financial and environmental features of technological alternatives
- To specify, list and rank the circular technology alternatives, by an integrated evaluation method.
- To show case on a real-life example, the validity, applicability and relevance of the developed method

- **Main Hypothesis**

Financial and environmental benefits are amplified by a comprehensive approach of CE implementation.



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A COMPREHENSIVE APPROACH FOR CIRCULAR ECONOMY OF RESOURCES USED IN CONSTRUCTION MATERIALS MANUFACTURING

- **Special Hypothesis**

Both kinds of benefits are complementary and of relevance for the industry.

- **Expected Scientific Contribution**

This research project aims to contribute to the existing body of knowledge by a novel method of identification and selection of technical, technological and economical solutions for introduction and/or improvement of circular economy principles in construction sector, specifically in production of construction materials.

- **Application of the Research Results**

The findings of this research have practical applicability in construction materials manufacturing companies. Furthermore, some of them will be applicable for other profiles of companies in the sector (consultancy, execution of works, quality control), as well as for research institutions. Additionally, policymakers and industry stakeholders can utilize the proposed method to inform policy decisions and foster an environment conducive to knowledge-driven innovation and economic growth within the business sector.

- **Keywords**

Construction Sector, Circular Economy, Technical, Technological And Economical Aspects, Holistic Approach, Complex and Integrated Benefits.