

PackAlliance

European alliance for innovation
training & collaboration towards future
packaging



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ABSTRACT

Plastics are an important and valuable material for the economy that is used in our daily life. However, at the same time they have serious downsides on the environment and health. World plastics production (2016) amounts 335 million metric tonnes of which a major part (91%) is not recycled and often ends up in the environment or incinerated. Roughly 40% of the plastic produced is used as packaging, which is used just once and then discarded.

The first-ever European Strategy for Plastics in a Circular Economy adopted in January 2018 highlights the need for transformation of the way plastic products are designed, used, produced and recycled in the European Union.

Key elements for this transformation within the plastic packaging sector are investments in innovative solutions and talented and skilled professionals able to transform waste into value. Nevertheless, the plastic packaging industry is affected by a shortage of professionals with appropriate skills in innovative packaging technologies & processes, and low level of collaboration between Higher Education Institutions & the Plastics Industry reflected by insufficient knowledge transfer and mismatched curricula. Hence, it is crucial to provide market oriented high education & training for students and professionals in the area of sustainable packaging.

PackAlliance is a Knowledge Alliance that brings together academic and industry partners from 4 EU countries (Spain, Poland, Finland and Italy) in order to foster Academia-Industry collaboration for innovation and competence building in innovative and sustainable packaging, as a nuclear element for the transition to the Circular Economy within the plastic industry. Based on the partners' experience and mutual interest for cooperation, PackAlliance consortium seeks:

- To equip HE students and packaging professionals with industry-demand skills required for circular economy transformation within the plastic packaging sector
- To modernise and align Higher Education Institutions curricula with the plastic packaging industry needs
- To establish innovation collaboration scheme between HEIs and industry on the knowledge, talent transfer and entrepreneurship in sustainable plastic packaging area



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DESCRIPTION

PackAlliance is a 36-month collaborative project based on a systematic and progressive methodology – so called waterfall methodology - that will help to achieve the goals pursued, to deliver expected outcomes, to maximise impact and to ensure transnational outreach of the project results. An European network was established in each participating country as an innovative connecting Academia-Industry space for undertaking common actions such as training, workshops and networking for possible R&I projects. Figure 1 shows the scheme of the network.

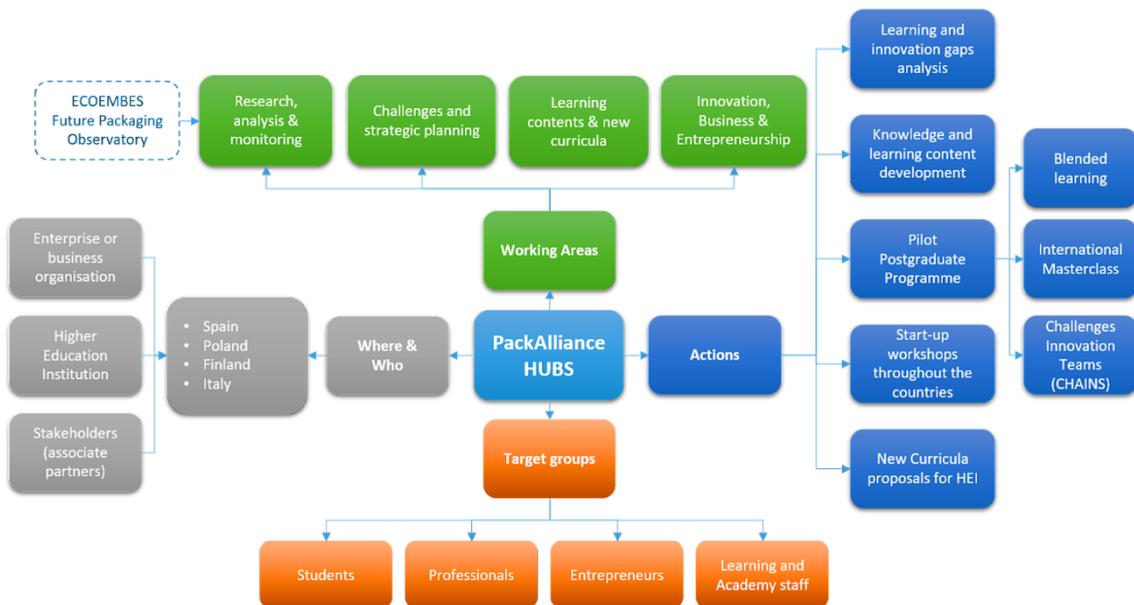


Figure 1. Scheme of the network. (PackAlliance Consortium)

The consortium members can be seen in the following figure:



Figure 2. Consortium members. (PackAlliance Consortium)

The methodology used is displayed in the following figure:

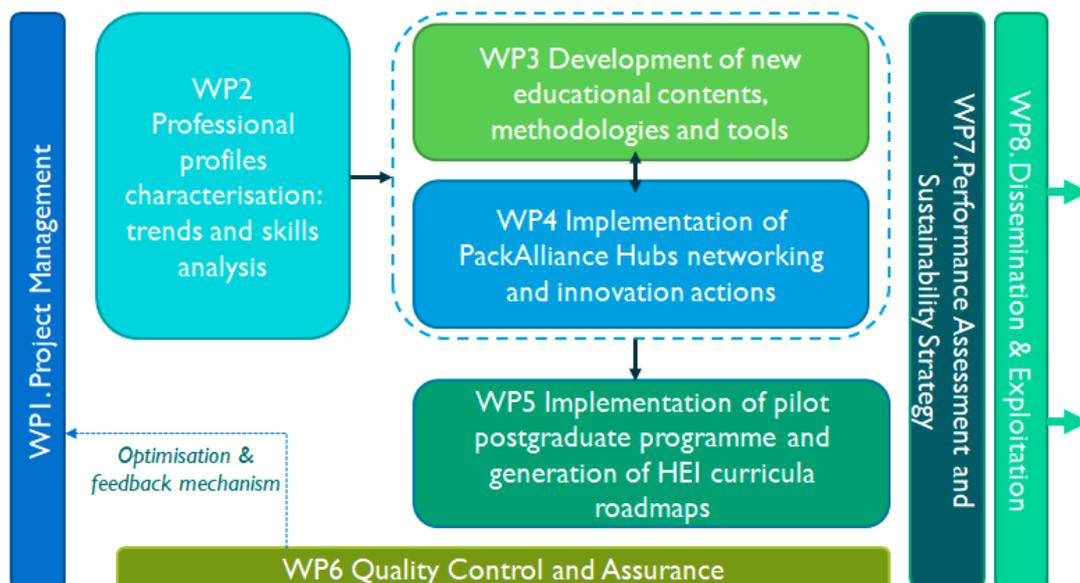


Figure 3. Methodology used in the project. (PackAlliance Consortium)

PHASE 1 - PREPARATION

This phase was dedicated to preparing a comprehensive evidence base in terms of data and information needed for the development of the next activities within technical WPs. The partnership collected and assessed data from three different perspectives: industry needs & challenges; educational offer available within HEIs; and policy priorities outlining short and mid-term initiatives in the plastic packaging and CE areas. This phase was implemented through WP2 and its main milestones and indicators are:

M1. About 40 representatives of the plastics packaging industry interviewed (M5)

M2. Professional profiles defined for 4 thematic areas: New materials and biomaterials; Eco-design & novel production processes; Citizen interaction & eco-marketing; and Residue management and valorisation (M10).

PHASE 2 – DEVELOPMENT

This phase was focused on the development of, on the one hand, a new Postgraduate Programme on innovative CE processes for the future plastics packaging industry, including a collaborative project-based methodology, and, on the other hand, the establishment of national Hubs for academia-industry collaboration on CE in the plastics packaging sector. This phase was implemented through WP3 and WP4, and its main milestones and indicators are:

M3. First draft of the postgraduate training programme methodology and contents (M18)

M4. Establishment of 4 PackAlliance Hubs in 4 EU countries (ES, IT, PL and FI). (M12)

PHASE 3 – IMPLEMENTATION, TESTING AND EVALUATION

This phase was dedicated to implement and test the contents and tools developed in phase 1 and phase 2 such as the postgraduate programme, collaborative real-problem-based projects (CHAINS) and innovation fostering mechanisms, such as start-up workshops in each country of the consortium partners. The performance of these activities was assessed to make the necessary adjustments for next editions of the training programme. This phase was implemented through WP5, WP7 and partly through WP4, and its main milestones and indicators were:

M5. First edition of PackAlliance postgraduate programme implemented for a total of, at least, 60 students (M30)

M6. At least 12 start-up workshops implemented in 4 EU countries (3 workshops per country - ES, IT, PL and FI-)

In addition, the partnership implemented horizontal WPs to ensure the high quality, smooth progress and outreach impact of the PackAlliance project.

The management of the project can be seen in the following figure:

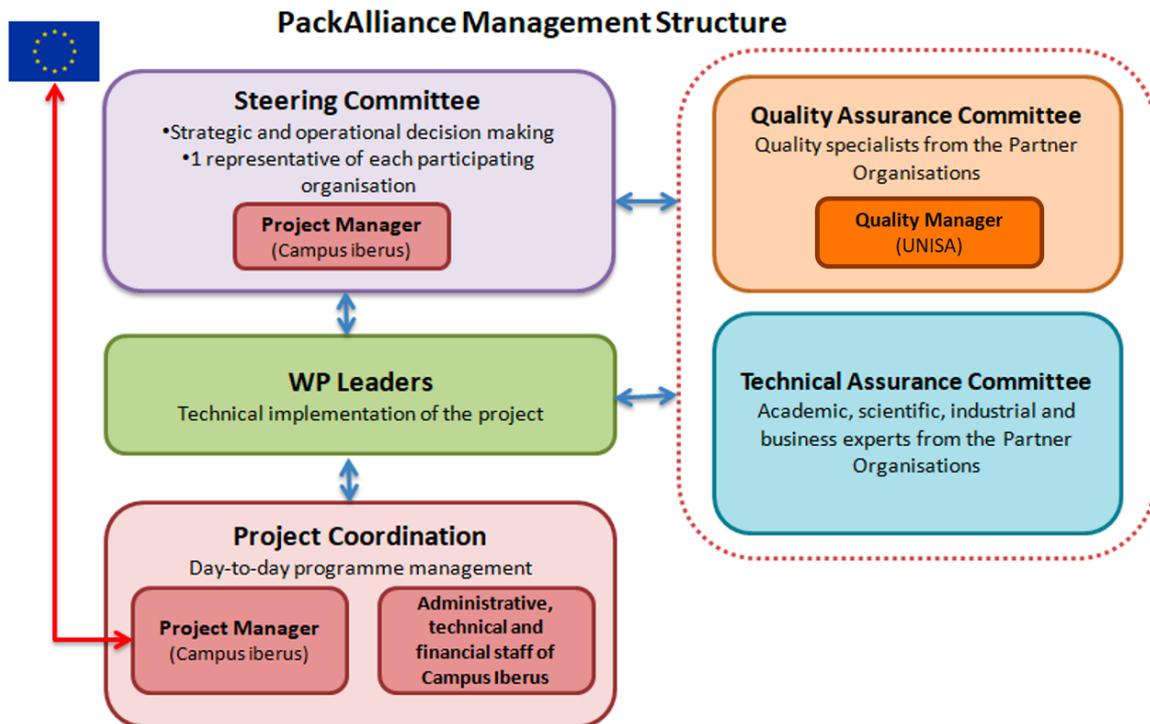


Figure 4. Management structure of the project the project. (PackAlliance Consortium)

The project was organized in 8 WP as follows:

"WP number" "WP title"

"WP1" "Project Management"

"WP2" "Professional profiles characterisation: trends and skills analysis"

"WP3" "Development of new educational contents, methodologies and tools"

"WP4" "Implementation of PackAlliance Hubs networking and innovation actions"

"WP5" "Implementation of pilot postgraduate programme and generation of HEI curricula roadmaps"

"WP6" "Quality Control and Assurance"

"WP7" "Performance Assessment and Sustainability Strategy"

"WP8" "Dissemination & Exploitation"

The pilot programme has been structured in 5 learning modules:

MODULE 1 New materials and biomaterials

The module on new materials and bio-based materials has reviewed the issues related to the knowledge of the possibilities of using innovative materials, including biomaterials in the plastic packaging industry in the context of the development of the circular economy. The module was divided into two parts.

The first part has focussed on importance of the latest knowledge in the field of material innovation in solving cognitive and practical problems in the area of circular economy,

Training of module 1 addressed:

- Characteristics of the principles of the circular economy, bioeconomy in the context of development of new materials and bio-based materials: main strategies in selected countries, regions and enterprises, analysis of determinants for development of the packaging, analysis of the legal act and industrial trends, tools for economic assessment
- Characteristics of new materials and biomaterials, and their types and use: bio-based, biodegradable, compostable, materials
- The production methods and raw materials of “new” and “bio” materials
- Rules of certification and labeling of biomaterials
- Evaluate the effects recyclable of the use of biomaterials in the circular economy

The second part was dedicated to entrepreneurship and to initiate activities, while showing concern for the environmental consequences of their professional activities.

Enrolled students learned:

- Principles of eco-innovations
- Physico-mechanical and biochemical properties of packaging materials and their influence on their use for packaging purposes
- Analyze and evaluate the available packaging materials for the production of packaging, including packaging intended for contact with food
- Management tools for implementation of CE for development of plastic packing in the field of new materials and biomaterials
- Methods of post-consumer packaging waste management

MODULE 2. Eco-design and novel manufacturing processing

The module reviewed strategy elements, methods and new production technologies to develop packaging solutions that are easy on the environment and conserve resources. The module was divided into two parts.

The first part was focused on selected strategy elements of packaging design for sustainability and on the evaluation of a product environmental impact:

Students learned:

- The four strategy elements to develop an Eco Design strategy for a packaging: (1) Design for Sustainable Sourcing; (2) Design for Optimised Resource Use; (3) Design for Environmentally Sound Use; and (4) Design for Recycling
- How to perform a Life Cycle Assessment (LCA) analysis

The second part was dedicated to novel manufacturing processing for packaging systems. It comprised the following topics:

- Technologies for innovative sustainable polymer compounds (nanocomposites, active systems, recycled systems, biopolymers)
- Overview on production processes for rigid and flexible plastic packaging: injection molding, blow molding, foaming, cast film extrusion, film blowing
- Novel processing technologies for rigid plastic packaging and prototyping: Advanced manufacturing processes and Additive Manufacturing techniques (3D Printing)
- Manufacturing processes for new packaging solutions: cast and blown film coextrusion and lamination
- Innovation and sustainability in surface treatments
- Sustainable printing technologies
- New production technologies and Industry 4.0

MODULE 3. Residue management and valorisation

The module on residue management and valorisation reviewed the issues related to the end of life of plastic packaging materials. The module was divided into three parts.

The first part was focussed on the optimisation of logistics, waste separation and sorting of packaging materials. Students learned:

- Introduction to polymer materials and polymer processing: main processing processes applied to the production of polymeric materials; requirements for the production of recycled plastic materials; current industry position on plastic production and recycling
- Residue management: municipal solid waste, management methods for solid waste handling; plastics value and lifetime

The second part was dedicated to recycling systems and novel business models for the second life of residues:

- Optimization of plastics recycling: strategies to increase the efficiency of plastic sorting and recycling processes
- Mechanical recycling: main methods and technologies available for the industrial recovery of packaging waste
- Secondary plastic products: examples and market trends

- Chemical recycling: main available alternatives and future prospects

The third part addressed the economic, environmental and legislative aspects of plastic waste:

- Economic and environmental analysis of plastic waste handling: landfilling, incineration and recycling
- European Union's strategy for plastics: key points and policies, stakeholders vision, and future scope

MODULE 4. Citizen and consumer engagement

The topics of communication, interaction, and engagement with focus on the consumers of plastic packaging and more broadly the citizens were discussed within this module. The module was divided into two parts.

The first part was focused on citizen interaction. Students were engaged in media follow up, role play and portfolio working to familiarize with the following topics:

- Principles of circular economy and its benefits to the society
- The relationship of plastic packaging, circular economy and the society
- Practices in communications planning and stakeholder engagement
- Effective use of communications and engagement methods
- Assessing the impact of communications and engagement campaigns

The second part was focused on consumer communication. Students benefited their personal experiences as consumers and got to know different companies' communication and engagement strategies to familiarize with the following topics:

- Characteristics of consumer behavior and consumer trends in plastics packaging in the era of circular economy - Understanding consumers of today and tomorrow
- Consumer communication and engagement regarding sustainable plastic packaging - Opportunities and pitfalls
- Value creation within circular economy – Viewpoints of consumers and the value chain players
- Applying consumer centered approach in the design of communications and marketing of sustainable plastic packaging

MODULE 5. Challenges Innovation Teams.

After the four thematic modules the programme included a hands-on module that was carried out in each PackAlliance participating country (Poland, Italy, Spain, Finland). This last module was based on project-based learning by creating small, tutored groups (CHAINS - CHallenges INnovation teams).

Each CHAIN worked over a period of 2 months, guided by appointed academia and industry mentors, in order to find innovative solutions to the challenges assigned by companies.

Expertise, support and resources necessary for the students' were provided by the PackAlliance Hubs.

CHAINS were developed using an innovative methodology called DIP (Define – Ideate-Prototype) based on Design Thinking and Design Sprint that has been tested over the last three years in TheCircularLab for solving Innovation challenges on the circular economy of packaging Waste.

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