

SUSTAINABLE INNOVATION THROUGH DESIGN

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1. ABSTRACT

Ecodesign is a well-known, well-established term that has been developing and has been implemented since the 1990s. The concept has evolved to integrate the other mainstays of sustainability, namely social and economic considerations, and it is hence called **Design for Sustainability** (DfS). DfS is of great use in achieving radical innovations in products, calling into question their functionality and influencing consumption patterns.

DfS is the systematic integration of environmental, social, and economic considerations into product design and development and the combination of products and services to satisfy consumer needs, without relinquishing traditional considerations such as usefulness, aesthetics, etc.

- Social considerations: Design for social equity, for people with special needs, respecting local traditional cultures.
- Environmental considerations: Design for reducing resource use throughout all life cycle stages, for increasing product lifetime and reusability, for avoiding harmful substances, and respecting the loading capability of local and global ecosystems.
- Economic considerations: Design for value creation for clients and stakeholders, reducing risks and promoting savings in materials resources, and respecting fair trade practices.

In recent years several noteworthy publications have appeared on the integration of the social dimension in design [1], [2]. However, these approaches are too generalist and not specific enough for the sectors, adversely affecting their implementation.

This study sets out the main results of the European project ***Sustainable Innovation through Design (SInnDesign)***, which aims to contribute to enabling vocational training students and workers in companies that manufacture products for the habitat, in particular, from the furniture, textile, and construction materials sectors, to implement sustainable innovations, thus enhancing product competitiveness and added value, at the same time supporting the objectives of the United Nations Decade of Education for Sustainable Development, the Europe 2020 Strategy for the creation of Green Jobs, and the Eco-innovation Action Plan.

A first project analysis on the current situation in the participant countries revealed certain shortcomings with regard to know-how for applying DfS and a clear need for training in order to systematically integrate sustainable and innovative considerations into product design management and development processes.

SInnDesign is addressing these needs by developing learning materials structured in a *step by step* approach, which facilitates user learning in order to develop products and product-service, through the compilation of data and the necessary information for planning, decision-making, and the implementation of sustainable solutions in design and innovation processes. In particular, the training materials help students and professionals to:

- Understand the environmental, social and economic impacts of products and services throughout the life cycle;
- Integrate sustainability considerations into the different product or product-service development stages;
- Develop design solutions that make products and services more sustainable;
- Understand the different functions in a company, their role in design for sustainability, and how to engage these;
- Participate with stakeholders in developing feasible joint solutions;
- Communicate with internal and external stakeholders on sustainability-related aspects;
- Strengthen links between DfS and management systems and social responsibility

The SInnDesign methodology allows the concept of DfS to be understood in terms of 7 principles: developing new concepts; improving the environmental, social, and economic work performance of raw materials; reducing materials use; improving the environmental, social, and economic work performance of production; promoting packaging and logistics with good environmental, social, and economic work performance; improving the environmental, social, and economic work performance in the use stage; increasing product lifetime and optimising its end of service life.

The training materials in SInnDesign comprise: a manual consisting of 10 theoretical modules, 7 practical application modules, and 7 tools; a book providing theoretical support with further information on the subject matter; a Resource Centre; a Good Practices Catalogue; and Handbooks for Teachers and Instructors.

The modular character of the material allows adaptation to the needs of the instructor, of the student and of the company's ambitions and starting point, it being appropriate for new product development as well as for redesigning already existing or similar products.

Strategies and guidelines have also been developed on a national level in each partner country to consolidate the aptitudes for implementing DfS starting from the first vocational training cycles by including the teaching materials developed in the curriculum of the relevant degrees in each case.

To assure the fitness, quality, and applicability of the SInnDesign material, this has been tested by students, teachers, and companies from the habitat sectors of the participating countries, through pilot training sessions. They have then been applied in a series of case studies. Specifically, each partner country has tested two habitat sectors, developing four case studies. In Spain these have been two ceramic products and two wood products developed by vocational training students together with companies. The case studies were as follows:

- 1) Ceramic display stand for Camper sales outlets. Two ceramic pieces were involved, a curved and a flat piece, whose design optimised materials use, enhancing the versatility of their applications. Final Project of the VET Higher Education Advanced Level on Ceramic Claddings. School of Art and Higher Design of Castellon.
- 2) IEstile: porcelain tile façade cladding designed specifically to enhance the bonds between Secondary School Centres and their users. Final Project of the VET Higher Education Advanced level on Ceramic Claddings. School of Art and Higher Design of Castellon in collaboration with the company Stratos Cerámicos.
- 3) Cuna Sweet Greens: an evolutionary cradle is involved that can be used from 2–3 months of age up to 10 years of age. Final Project of the VET Higher Education Advanced Level on Wood and Furniture of the Integrated Public Vocational Training Centre of Catarroja with the collaboration of the MICUNA company.
- 4) Chester-Folding sofa: a seat for indoor and outdoor use made by means of folding techniques from flat high-density fibreboard. Integrated Public Vocational Training Centre of Catarroja.

The SInnDesign consortium is made up of universities and training and research centres from Spain, Denmark, Austria, and Portugal. The project is funded by the European Union through the Leonardo da Vinci Lifelong Learning Programme.

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