CLEANTEX

Clean and Innovative Textiles Strategy for Circular Economy

MODULE 2
Eco-Design for Circular Economy

Unit 2.3
Case Studies

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2.3.1. Introduction

The present unit shows **successful real industrial cases** focused on Eco-design, and analyses the **methodologies** and **tools** used to develop it.

Those real cases are replicable, which means that its methodology can be used in similar cases. A deep knowledge of each example will allow us to adapt it to the context, in future occasions, to obtain equally satisfactory results.

The explained cases are divided into three groups:

- Product cases
- Process cases
- Service cases

2.3.2. Product cases

2.3.2.1. Example 1: hackathons

DESTEX project uses hackathons to achieve its objectives.

In order to foster innovation within the emerging sector of Advanced Textile Materials, higher education programs need to uptake and reinforce creativity and design aspects into textile engineering programs. In this context, DESTEX project develops **innovative training tools** targeted to higher education students.

PROBLEM EXPOSED: An invited company in the advanced textiles sector exposes a real problem related to sustainability (e.g. the production of textile scraps from the manufacturing process that nowadays go to landfill). They look for a sustainable solution, involving circular economy, etc.

METHODOLOGY: in this case, hackathons are proven to be a good tool. A hackathon, originally, is defined as an event in which a large number of people meet to engage in collaborative computer programming. Nowadays are used as a tool to boost general innovation, and defined as a participatory innovation method, aiming also to create an environment where it is possible not only to innovate with hard work but also to meet new persons, discover new things, have fun in the "geek style".

RESULTS: Each group of students develop a solution. The company evaluates the proposals according to a pre-stablished criterion.

LEARNINGS:

- The company has more than one solution to choose.
- Ideas out of the box.
- In person or online.

2.3.2.2. Example 2: workshops

Ecodistex project uses workshops to achieve its objectives.

Ecodistex project aims to **provide eco-design knowledge** to the textile industry so that they can incorporate environmental criteria in the manufacture of their products.

It supports companies applying environmental criteria to products by:

- ▶ Identifying their needs and requirements

- Organizing an **eco-design workshop**
- Eco-designing three textile products

PROBLEM EXPOSED: Companies that participate in the project are concerned about the end of life of their products and they want to improve this characteristic thorough eco-design.

METHODOLOGY: Once the needs of the companies are targeted, a **workshop** for all the participant companies is held. This allows:

- the creation of training tools.
- to give individual support for companies who require it.

RESULTS: The companies clearly know the eco-design concept and have examples of practical cases. They can identify possible improvements in their own production process.

LEARNINGS:

- Eco-design applicable to the whole value chain.
- Personalized support focused on the specific problem of each company.
- Shared information between companies in the workshop. Everyone learns from everyone.

2.3.3. Process cases

2.3.3.1. Example 1: practical analysis

LIFE-FLAREX and MIDWOR-LIFE studies how to mitigate the environmental, health and safety impacts caused by current flame retardants and DWORs (Durable Water and Oil Repellents), respectively, and their alternatives, by **analyzing their environmental impact and technical performance** in order to assess manufacturers on the best available technologies to provide flame retardant and liquid repellency on textiles.

PROBLEM EXPOSED: There is a huge variety of chemical products used in textile finishings. Some of them, like the ones used for flame retardancy and water/oil repellence, are highly efficient but harmful for the environment. Companies **need to know alternatives** that give the same technical results but are environmentally friendly.

METHODOLOGY: The methodology used in this case is a bit more complex because empirical data is needed. The steps that were followed are:

1. First of all, the partners of the project identified and selected the different textile materials and finishing technologies and products to be employed for the following actions. A survey directed to textile companies was sent to identify current use of FR products (composition and quantity) and experiences with other technologies.
2. In the following action, partners did a pre-screening of the technical performance and environmental impact of the selected products and their alternatives. The pre-screening took place using available information from the products, databases or provided by manufacturers but also bibliography, databases and by collecting the information provided by the cluster's members.
3. Then, once real cases and bibliographic information are gathered, the demonstration starts. Trials at pre-industrial and at industrial scale were performed. The harmful products and their non-toxic alternatives selected and studied in the preparatory actions were employed to perform these activities. Also, standards to be tested on the treated fabrics are selected.

4. The next phase consists of the study of the risk assessment and environmental impact of the chemical products currently used and their alternatives. In this step, other tests can be done, if necessary.
5. In order to disseminate the outcomes of the project, workshops are done with the stakeholders.
6. Also, the project can set policy recommendations in order to promote the widespread implementation of alternative chemical products.

RESULTS: Companies obtain technical and environmental information, adapted to their processes, on possible substitutes for flame retardant / liquid repellency chemicals they currently use.

LEARNINGS:

- The project is managed through a cluster, which gains visibility.
- Critical mass resolves the problem.
- Low risking for the companies, as the tests are done by the project.

2.3.3.2. Example 2: intercluster collaboration

The key goal of the PACTEX project, promoted by the Packaging Cluster and AEI Textiles, is to establish synergies between companies associated with both clusters and encourage effective use among them of material resources, through the waste reduction at source industrial.

The project detects which resources end up becoming a residue prematurely, and which ones have the potential to be employed as raw materials again, re-entering the value chain.

PROBLEM EXPOSED: Industries generate waste material during their production process, which could be reintroduced into the value chain by companies in other sectors if there was an exchange of information.

METHODOLOGY: The **two participating clusters** promote the meeting of their companies with the aim of finding synergies between them. An industrial synergy is obtained by the conventional processes. This new methodology avoids the negative impacts that previously existed.

RESULTS: Some results are obtained thanks to the collaboration. E.g. NG Plastics obtains recycled PP chips coming from Liasa PP cords manufacturing process. This product saves energy, CO_2 emissions and residues. Also, from both sectors point of view, this means a saving in the waste management and also in the purchase of raw material.

LEARNINGS:

- Intersectorial and intercluster collaboration.
- The establishment of synergies between the two industries has proven to be a key point in waste prevention of both sectors.
- New products can be designed thanks to this new approach and in the circular economy context.

2.3.4. Service cases

2.3.4.1. Example 1

Arpe is a microfiber products manufacturer that teams up with DIR gym to change their towels. Arpe promotes a sustainable and circular economy business model for towels with multiple lifes using a take-back system. This approach makes possible to improve the sustainability of the whole life cycle of product.

PROBLEM EXPOSED:

DIR gym grants towels to its users. This service is not environmentally friendly, and Arpe, the towels manufacturer, redesigns it.

METHODOLOGY:

- **Analise the whole life cycle** of a gym towel and its impacts.
- **Design a solution** according to the observations.
- **Manufacture** the towels and organise the other parts.
- Life cycle **analysis**, comparing the solution to the previous product.

RESULTS:

The new product offers better environmental characteristics compared to the old one during all the life cycle, such as its quick drying (and consequent energy saving) and less volume (which is better for logistics).

LEARNINGS:

- Cooperation between two parts can help to design products better adapted to the needs (of the users, the planet…).
- Minimized impact in the whole life cycle of the studied product.
- Multiplier effect by including different agents in the value chain.

2.3.5. Conclusions

- The examples are specific, but the methodology/tools used is replicable.
- Different methodologies/tools that obtain different results.
- Different methodologies/tools to reach different targets.
- Circular economy can be applied to the entire life cycle of the product. Actions can be taken in a concrete or global way.
- Important to include different actors in the value chain, also including clusters and VET and HEI students.

USED AND INTERESTING REFERENCES

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