NEW RESEARCH OPPORTUNITIES IN ECO-INNOVATION FROM TWO YEARS OF COLLABORATIVE RESEARCH PROJECTS

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Eco-design: a well-established concept

- “Integration of environmental aspects into product design and development, with the aim of reducing adverse environmental impacts throughout a product's life cycle.” [ISO 14006:2011]

Eco-innovation: a polysemic term

- “a new product, process or service, development (NPD) process that provides significant environmental performances” [Fussler & James 1996]
- Ill-understood concept with many theoretical uncertainties [Andersen 2008]
- Inventory of 16 definitions related to eco-innovation and sustainable innovation [Carrillo-Hermosilla et al. 2010]

Divergent viewpoints about eco-innovation

- Intensity of the eco-innovation: radical / incremental [Baroulaki, 2007]
- Integration of the social aspect in the scope of the eco-innovation [Cucuzella, 2008; Charter et Tischner, 2001]
INTRODUCTION (2/2)

CONTEXT & OBJECTIVE

Two EcoSD Collaborative Research Projects performed in eco-innovation from 2012

**2012-2013**: Eco-design vs. Eco-innovation: what is the perception of companies?

**2013-2014**: Environmental evaluation of ideas in the upstream phases of an eco-innovation process

Eco-innovation process

- Eco-ideation
- Eco-evaluation
- ...

Objectives of the study:
- To make the synthesis of two years of projects.
- To identify new research directions in eco-innovation.
• Difficulty to clarify the **similarities and differences** between eco-design and eco-innovation.
• Difficulty to draw a **clear boundary** between these two concepts.
• Surveys on **industrial implementation** of eco-innovation are scarce

[Santolaria et al. 2011; Bocken et al. 2014]
RESEARCH PROJECT #1

METHOD: INDUSTRIAL SURVEY

- 12 French organizations having at least a recent experience in eco-design
- Semi-directed in-depth interviews with 18 persons

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Definitions, differences, maturity

Innovation process and organization

Sustainable considerations in projects

Methods and tools

Experience feedbacks

Number of employees

Years of experience with eco-design

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RESEARCH PROJECT #1
RESULTS

• Ambiguity still remains between eco-design and eco-innovation
• Eco-innovation is not clearly supported by an eco-innovation process
• Eco-innovation can result from the introduction of economic and environmental constraints in the design process
• Although numerous eco-innovation tools and approaches were developed by academics, none of them were cited

Knowledge transfer from academia to industry is crucial and requires a special attention

• Limits of the survey:
  • Size of the sample
  • Troubles generated by the use of the term ‘Eco-innovation’ in the questionnaire.
RESEARCH PROJECT #2
CONTEXT & OBJECTIVES

What is the influence of the method on the selected ideas and emerging concepts?

How to turn elementary ideas into concepts with a high environmental potential in a design team?

Eco-design
Eco-innovation

Field of research

LCA method
Streamlined LCA
[Hunt et al. 1998]

Fast track LCA
[Vöglander 2012]

Product Development

Analytical Hierarchy Process (AHP)
Quality Function Deployment (QFD)

Design
Eco-design
Eco-innovation

Product Development

Analytical Hierarchy Process (AHP)
Quality Function Deployment (QFD)

How to turn elementary ideas into concepts with a high environmental potential in a design team?

What is the influence of the method on the selected ideas and emerging concepts?

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RESEARCH PROJECT #2

METHOD

• 2 case studies
  • New usages of crumpled paper (UTT) → 14 ideas
  • The next generation of parking meter (Parkeon) → 15 ideas
• 12 eco-design experts + 2 Master students
  • 3 Groups (academic, industrial, consultant, student)
  • 2 evaluation methods + 1 control method
  • 2 * 2 hours sessions = 6 experiments → Each method applied on each case studies

Method 1: Combineval (inspired from [Fussler & James, 1996])

Method 2: Geneval

Control method

Evaluate (including environmental & economic potential, technical feasibility, functional utility)
RESULTS

- Evaluation and environmental scores are **highly dependent on the method employed**
- Geneval and the control approaches are relevant to capture ideas with a promising environmental potential

- Geneval and Combineval more relevant for **ideas with low maturity level**
- Control method **high team adhesion** but limited to the assessment of ideas

The format of ideas is reported as a major issue
What are the new research directions in eco-innovation emerging from these research projects?

1. Develop stimulation mechanisms and appropriate format of ideas

2. Make environmental assessment of ideas simpler and more efficient

3. Reduce the gap between academia and industry
RESEARCH DIRECTION #1
ECO-IDEATION

Develop stimulation mechanisms and appropriate format of ideas

• A lot of eco-ideation tools exist, but none of them are used in industry
• They are judged too complicated or not adapted
• Instead of developing new methods and tools, existing ones should be improved with
  • **Stimulation mechanisms** [Tyl and Vallet 2015]
    • On-going work: a toolbox of 9 Eco-ideation Stimulation Mechanisms (ESM)
    • Based on technical, economical and social dimensions of eco-innovation.
  • **Adapted format of ideas**
    • To preserve/transfer information during the eco-innovation process
    • To help evaluation of ideas with a comparable level of detail for all ideas

• What should be the **right eco-ideation tool in a given context**?
RESEARCH DIRECTION #2
ECO-EVALUATION

Make environmental assessment of ideas simpler and more efficient

• Going further in the **assessment of environmental evaluation methods** and tools
  • What are the most efficient ones?

• What should be the **right eco-evaluation method or tool in a given context**?
  • Adapted **format of ideas**: which input/output for the eco-evaluation stage?
  • Co-creation of **environmental/sustainability criteria** in project teams?
  • How to **adapt the method/tool** to the context/product?
RESEARCH DIRECTION #3
ECO-INNOVATION PROCESS

Reduce the gap between academia and industry

Academia

Industry

• With **more efficient and improved methods and tools**, transfer to academia should be facilitated
• This is **necessary but not sufficient**
• How is it possible to go further?
  • By **integrating business model** aspects
  • By **working closer with industry**
  • By **improving the integration** of eco-innovation methods and tools in existing eco-design or innovation processes
  • By **highlighting advantages** of eco-innovation
  • …
How to implement these research directions?

• Develop **collaborative research projects** in eco-innovation
  - At the French level (EcoSD, ANR ALIENNOR, ADEME…)
  - At the international level (European projects…)

• **Collaborate closer with industry**
  - Co-development of methods, tools, processes, good practices…
  - Identification of case studies and testing grounds in multiple sectors

• **Share knowledge and experience** with academia and industry
  - Through scientific publications
  - Through dedicated events
    - EcoSD workshop « *The challenges of eco-innovation: from eco-ideation toward sustainable business models* », March 2015, Paris, France
  
    → **Proceedings to be published in a few months**
Thanks for your attention

www.lgi.ecp.fr
REFERENCES