



Innovative Finance Inclusion

Simulation: An Educational Game to learn Circular Economics

A Teaching Experience

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Abstract

Transition to circular economy is based on a shifting from economic to **ecological rationality**. This means that the economic choice processes are not only based on matter processes (physical inputs and outputs) but also on energy flows. Economic processes, like the biological ones, are unidirectional and irreversible. Energy used and embodied in products cannot be reversed without production of entropy and further consumption of natural resources. This means that economic agents have to adapt to the **environmental constraints** and not consider their wants as unlimited.

The environmental impact of economic actions is fundamental not only on respect of the scarcity of resources but also with respect to the **planet carrying capacity**. Efficiency, normally defined as the output of an optimization process, assumes a broader meaning within the ecological framework, viz. it has to assume a **conservative perspective** in defining the use of resources and energy. Two different impact levels enter into the **decision-making process** of economic agents: the geographical distribution of resources needed to produce goods and services and the carrying capacity of the planet on an intertemporal scale.

In the former case, we expect the individual be **loyal** to his or her territory (values of place identity) while the second requires **ethical values** belonging ecological goals. The choice process results more complex because it has to be considered, at the same time, two different **spatial-temporal scales**: the satisfaction of local needs in the short run, and the maintenance of biodiversity or the preservation of virgin resources in the long run.

To make experience of this complexity an educational game has been introduced in the master course of “Circular Economics and Local Development”. Around 30 students played the game assuming they were a technology product company making strategic decisions in a dynamic macroeconomic environment. The “In the Loop” game developed by a Swedish startupper aims to promote learning about circular economy and businesses.

The **learning activity** was very effective. The students enjoyed the structure of the game in terms of systemic interactions (peer education) and problem-solving activities. The introduction of this learning activity increased the students' attention during the subsequent lessons on circular economics and their participation on the debate concerning the relationship between sustainability and circularity.

Keywords

Circular Economy, Sustainability Awareness, Educational Learning, Business Models, Development of Ecological Values within Economic Decisions.



The Course Organization

The *IntheLoop* game has been played during the course *Circular Economics and Local Development* at the master in Local Development, University of Padova, Italy.

Aim of course is to develop the students' capacity to understand and critically evaluate the **linear-to-circular transition** required by the EU Agenda 2030 to challenge the European environmental and social sustainability.

The course framework includes **four** different **sections**: discovering the founders of ecological economics theory, principles of sustainability science, from linear to circular economics, the role of circularity for local development. The educational game plays a relevant role in this framework creating the **learning attitude for sustainability concepts and ecological awareness**.

Given that students have very different backgrounds, with this game they experience their differences in the **perception of sustainability problems** (e.g., social vs environmental ones), their capacity/difficulty to develop a sustainable business model, their ability to understand the role of social/institutional choices.

In The Loop Game

Students have been split into two groups. Each group played its game.

Each participant has a company role in the game world which is based on the following simplified concepts:

- Each Country produces one material
- To produce a product, a company requires two or three materials
- Companies have a limited access to material reserves
- Mining cost of material is the result of casual process (roll of dice)
- Products can be recycled, substitute and redesign
- The supply chains are simplified
- Companies have to adopt strategies of circular management to become sustainable

The game takes around 4 hours organized in the following way:

1. Introduction of the game rules and aims
2. Set up the game materials
3. Each company have to keep a diary of their decisions, doubts, questions arising during the game



4. Discussion of the game experience and collection of the most relevant questions stemmed from the learning experience.

The students' interaction was fruitful because:

- They identified some critical issues of the transition to circularity related to companies' decision-making processes.
- They experienced the effect of the cognitive framework based on ethical principles including environmental protection.
- They have experienced the complexity of intertemporal economic decisions.
- they were faced with the conflict between market efficiency (profit decisions) versus ecological conservation.
- They have experienced the dynamism of decisions in changing macroeconomic contexts as the game involves continuous positive and negative shocks that influence companies' choices and actions.

References

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