

POLITECNICO DI TORINO  
FIRST SCHOOL OF ARCHITECTURE  
Master of Science in Eco-efficient Product Design  
*Honors theses*

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**System Design: coffee ground reuse, new products and territory valorisation**

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Our thesis "SYSTEM DESIGN: COFFEE GROUND REUSE, NEW PRODUCTS AND TERRITORY VALORISATION", was born in September 2007 during the course of System design of Polytechnic of Turin, coordinated by Prof. Luigi Bistagnino. The thesis want analyse pre-existing products systems and locate critical situation to redesign for output valorisation.



The protagonist of our project is **COFFEE GROUND** that after chemical analysis is a product that owns still important quality as nitrogen and lipids.

Our system project regards whole territory Piedmontese where there are 4.300 bars that produce every year 4.000 tons of coffee ground that now are throw away into the undifferentiated waste. Our objective is a **valorisation of coffee ground** and its usable **qualities**.

After to pick up the coffee ground from bars, the first important treatment is **supercritical CO<sub>2</sub> lipids extraction process**. The lipids are more important for the production of medical and cosmetic products that sell to industry of this sector. After this treatment the coffee ground has still important proprieties as nitrogen, minerals and carbohydrates that make the coffee ground an **important input** to the mushroom substrate.

**The ideal percentages of mushroom substrate** are 30% coffee ground, 2% chalk, that is an alkaline balance and 68% input from territory, that brings cellulose, emicellulose and lignina and the input change for: morphology, territory availability and periodicity.



Mushrooms *Pleurotus Ostreatus* cultivated at “Città dei Ragazzi”, Turin hill

After the substrate's analysis we choose the mushroom: **Pleurotus Ostreatus** for different reasons: - the mushroom is cultivate in plastic bags ; - for the important quality food; for the Betaglucani that give to the mushrooms medical quality. After the cultivation, the **spent substrate** could be use as cattle feed, as agriculture fertilizer or to **vermicompost** production (high quality fertilizer).

The last part is dedicate to two cases history: the first one is an example of mushroom cultivate in Turin and the second one is an deepening of lipids extraction. The Industrial Design research group made a little mushrooms cultivation with coffee ground. The substrate was composed by coffee ground, straw and chalk. We cultivated the mushrooms at "Città dei Ragazzi", a place that give training job to young poor people.

The experimental mushrooms was used during the "Salone del Gusto 2008" in dedicate exhibitor place along Via Maestra.



The project stand, Salone del Gusto 2008, Via Maestra

In regard **supercritical CO<sub>2</sub> lipids extraction**, Lavazza (the most important coffee industry in Italy) still now use machinery for only caffeine extraction. Thanks to Ing. Achille Marciano consultation, we understand how this machinery could increase its capability with simple modifications such as add filters that could extract as well as caffeine also lipids.

In conclusion we reflect how a simple daily action as drink a cup of coffee could open new sceneries about the territory capability and could create “new culture”.

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