#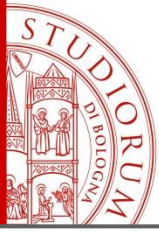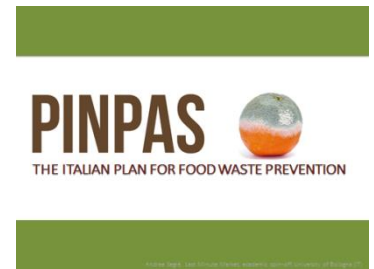 Does Kuznets explain the consumer's income - household food waste relation? Preliminary evidences from an Italian case study

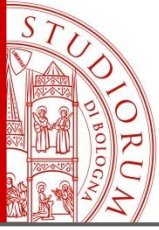*London, Food Standards Agency, 16.04.15*
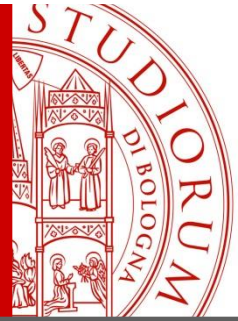
Matteo Vittuari

Background I

Background II

Food waste (FW) relates to the food value chain as a whole and in particular to the decisions of retailers and to consumers' behavior.

It represents a major concern at the global level, since it is still often cheaper to dispose of food than to use or re-cycle it, and in many situations consumers can afford to waste food.
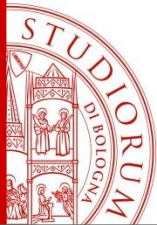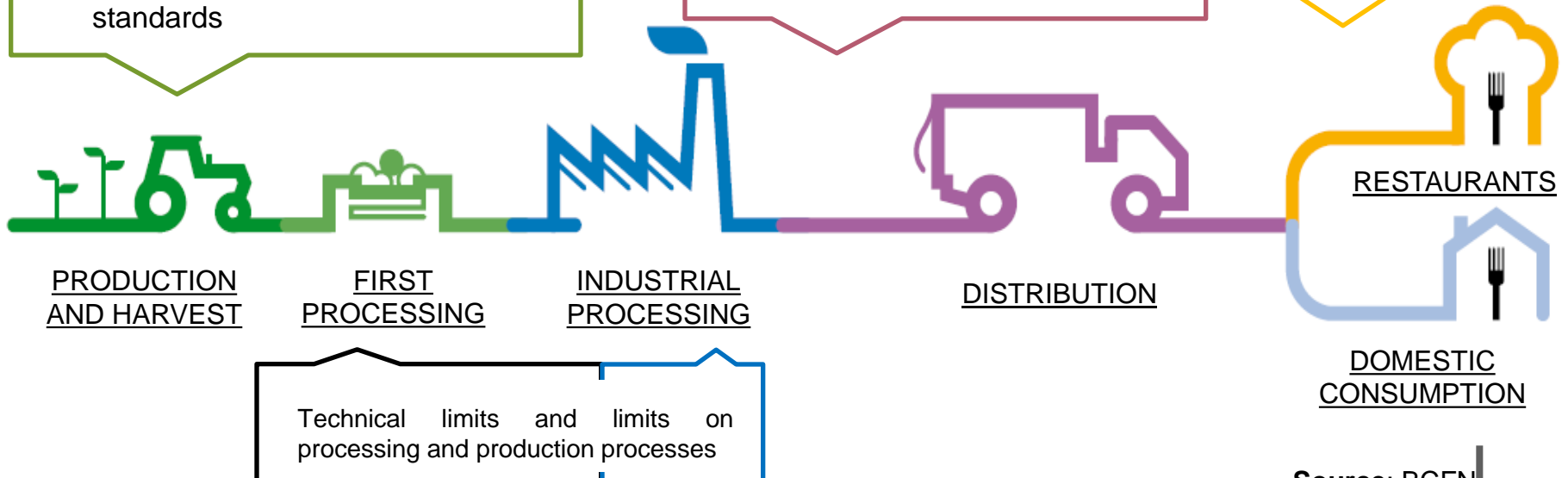
Causes of food losses and waste

- Limitations on agricultural techniques and transportation and storage infrastructure
- Climate and environmental factors
- Production surpluses
- Compliance with regulations and standards

- Limits on the distribution system
- Errors in order forecasting and management of reserves
- Deterioration of products and packaging
- Marketing and sales strategies

- Excess purchases
- Excess portions
- Labels misunderstanding
- Errors in food storage
- Attitudes
- Cultural norms
- Individual behaviour …

RESTAURANTS

PRODUCTION AND HARVEST

FIRST PROCESSING

INDUSTRIAL PROCESSING

DISTRIBUTION

DOMESTIC CONSUMPTION

Technical limits and limits on processing and production processes

Source: BCFN

Objective
income - household food waste relation

Scientific literature shows little evidences about the income - household food waste relation.

This work aims to contribute to fill this gap challenging the capacity of the Kuznets curve to explain the individual income - household food waste relation by analyzing the food waste frequency and its main drivers in a **household panel survey conducted in Italy in 2013.**

In economics, a Kuznets curve graphs the hypothesis that as an economy develops, market forces first increase and then decrease economic inequality.
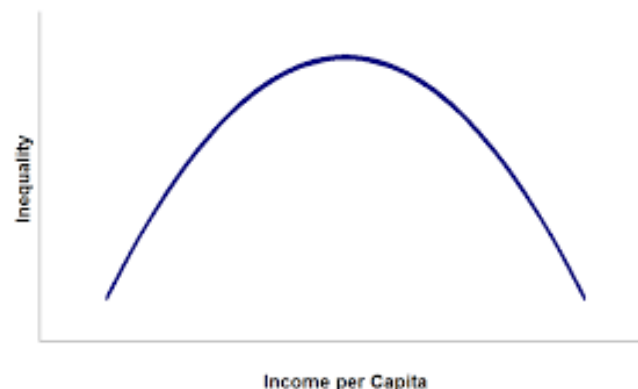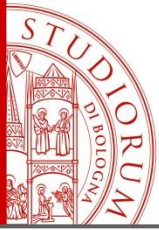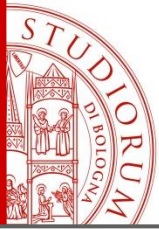
Methodology I

Sampling and data collection

The questionnaire, consisting of 104 questions, was submitted in 2013 to a sample of 1,706 final users who were statistically representative of the Italian population by region of residence, gender, age and demographic categories as well as representative of the economic profile of the researched population.

In fact both the per capita income percentage sampled (63% of the sample residing in the south of the country declared that they earned less than 800 €, while 38% in the north belonged to the same income level) and the perceptions of wealth (poverty and difficulties "at the end of the month" were reported by 8.2% of the sample residing in the south versus 4.2% in the north) reflect the official 2013 statistics on the economic conditions of the Italian population.
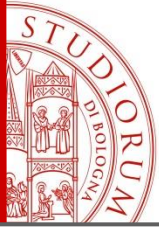
Methodology II

Food waste behaviour and their determinants are modeled for specific food typologies (fresh bread, cheese, yogurt, fresh fruit, fresh veggies) by developing proportional odds models that implement stepwise/backward/forward procedures and genetic algorithm methodologies to select explicative variables from a panel of 20.

The proportional odds model is a class of generalized linear models used for modelling the dependence of an ordinal response on discrete or continuous covariates.

Genetic algorithms belong to the larger class of evolutionary algorithms (EA), which generate solutions to optimization problems using techniques inspired by natural evolution, such as inheritance, mutation, selection, and crossover.

Methodology III

This study focuses on the waste frequency of fresh bread, cheese, yogurt, fresh vegetables and fruit which represent different food categories in terms of economic quality, consumer choice and impact on food waste. With reference to these factors, the analysis was conducted on 20 explanatory variables regarding social and economic status, different types of food purchasing and management, as well as the ethical and environmental sensitivity of **1,403 statistical units**.

The reduction of the sample is due to presence of "*missing*" in variables characterized by increased sensitivity.

Missing = is a value that indicates that no data value is stored for the variable in the current observation.
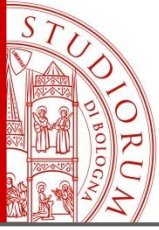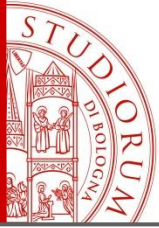
Current limitations

Although the results are statistically significant, it is important to consider that:

- they are the outcome of questionnaires based on self-assessments
- they are the result of cross-section analyses that do not allow temporal comparisons (the survey is now conducted on a year basis by Waste Watcher)
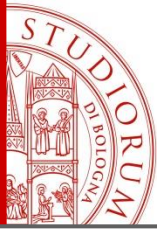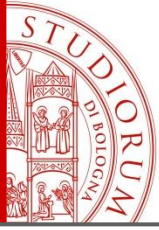
Highlights

- There is a complex and non-unique relationship between income and household food waste that is diversified for the different products taken into consideration

- Lower individual income generally lead to a greater incidence of waste behavior, but only for certain food categories

- Individual income level emerges as a major determinant of household food waste frequency

Highlights

The study assesses the capacity of the Kuznets' curve to explain the consumer's income - household food waste relation. <u>Preliminary results</u> suggest that such a relationship between the explanatory variable (individual income) and the response variable (food waste frequency) might exist under specific conditions:
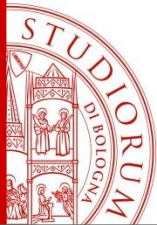
- in case of high value food products (i.e cheese)

- in cases when waste behaviour (frequency) is influenced by consumer choices driven by risk adversion (as in the case of lower income levels)

Highlights

Overall results display an array of factors contributing to the phenomenon of food waste, calling for the adoption of diversified strategies to fight food waste: research and development, investment support policies, measures for technological and organizational innovation of food supply chains, income support measure, consumer training and empowerment processes, communication campaigns).

Looking specifically at research - also due to the diversified causes (and drivers) of food waste - there is an increasing need to lead interdisciplinary work looking consumer (and business) behaviour from different disciplines (i.e. through the work on bayesian networks + agent based model).

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