

**FACOLTÀ DI AGRARIA**

ALMA MATER STUDIORUM · UNIVERSITÀ DI BOLOGNA

# Recent Developments in multi-criteria evaluation of regulations

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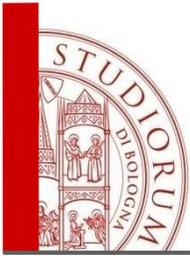
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# Outline

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- Introduction
- Objective
- Policy evaluation
- Multicriteria analysis (MCA)
- Application of MCA to policy evaluation
- Discussion
- Concluding remarks



# Introduction (1)

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- Agricultural and Agri-food activities are affected by a wide set of regulations and prescriptions due to agricultural and non-agricultural policies
  - Decision Makers' (DM) actions affect society and impacts on democracy, ethics, transparency, responsibility and accountability
  - Complexity of human interactions, uncertainty, value conflicts make it difficult to foresee and estimate the effects/impacts of public DM actions



# Introduction (2)

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- Demand for public evaluations have increased in recent years with the aim of:
  - improving the quality of policy making
  - Improving the policy implementation process
- In EU context it is common to have ex-ante and ex-post evaluations realised by:
  - Same Institution
  - Consultants
  - Researchers



# Introduction (3)

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- A wide body of literature exists on the assessment of agricultural and food policies
  - evaluated through a quantification of efficiency or effectiveness
  - entire program or a single measure
  - evaluation tools: Cost Benefit Analysis or Multi-criteria Analysis



# Introduction (4)

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- Policy evaluation results provided by available tools are not completely satisfactory due to:
  - representation of a complex system (Funtowicz et al., 1999; Munda, 2000);
  - an operational definition of “value”: representation of the importance placed by different social actors at different elements (Munda 2004)
  - uncertainty (Stirlings 1998)
    - temporal distance between the policy implementation and the policy impact
    - limited knowledge about the future states of nature/conditions



# Objective

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- The objective of this presentation is to provide a literature review of the Multi-criteria Analysis applied to the context of policy and regulation evaluations

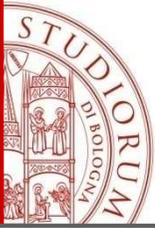


# Policy Evaluation (1)

## Definition

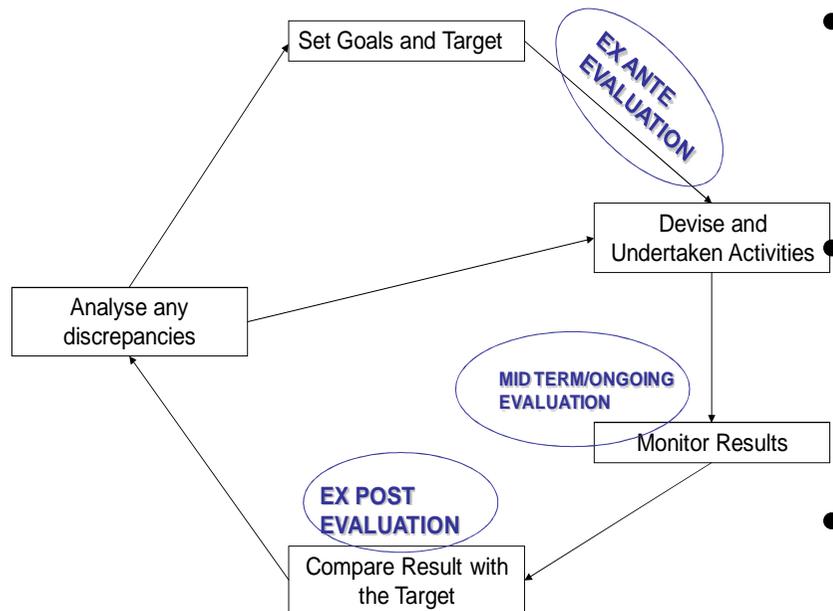
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- “objective, systematic, empirical examinations of the effects ongoing policies and public programs have on their targets in terms of the goals they are meant to achieve” Nachmias (1979)



# Policy Evaluation (2)

## Typology



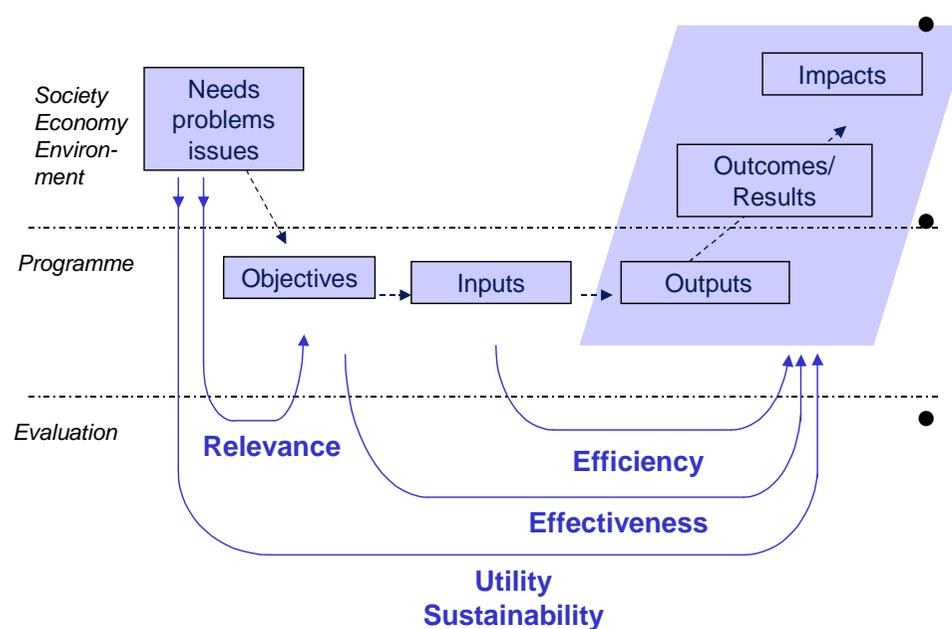
Source: Bartolini et al., 2005

- Ex-ante:
  - policy is still to be implemented
  - to define/choose policy parameters (policy design)
- Ex-post:
  - the policy has already taken place.
  - to evaluate policy outcome in order to gain information useful to revise policy design
- Mid-term/ongoing:
  - between the ex-ante and ex-post
  - check of the preliminary results and the achievement of the policy objectives,
  - used to collect information about the feasibility of the ex-post evaluation



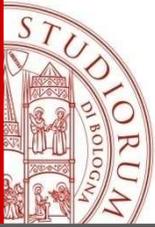
# Policy Evaluation (3)

## Evaluation Criteria



Source: Evalesd 2009

- **Relevance:** measures the coherence and pertinence of the policy with the society, economy or environmental needs
- **Utility:** judgment on the degree to which the impacts obtained by the program are in relation to broader societal and economic needs
- **Sustainability:** judgment on the degree to which the impacts obtained by the program are in relation to broader societal and economic needs and are durable over time
- **Effectiveness:** the extent to which a policy achieves its objectives
- **Efficiency:** the extent to which a policy may achieve these objectives at a minimum cost.



# Policy Evaluation (4)

## Evaluation Purposes

Criteria	Evaluation typology		
	ex-ante	mid-term	ex-post
Relevance	X	X	
Effectiveness	X	X	X
Efficiency	X	X	X
Sustainability			X
Utility			X

Source: European Commission 2004, modified



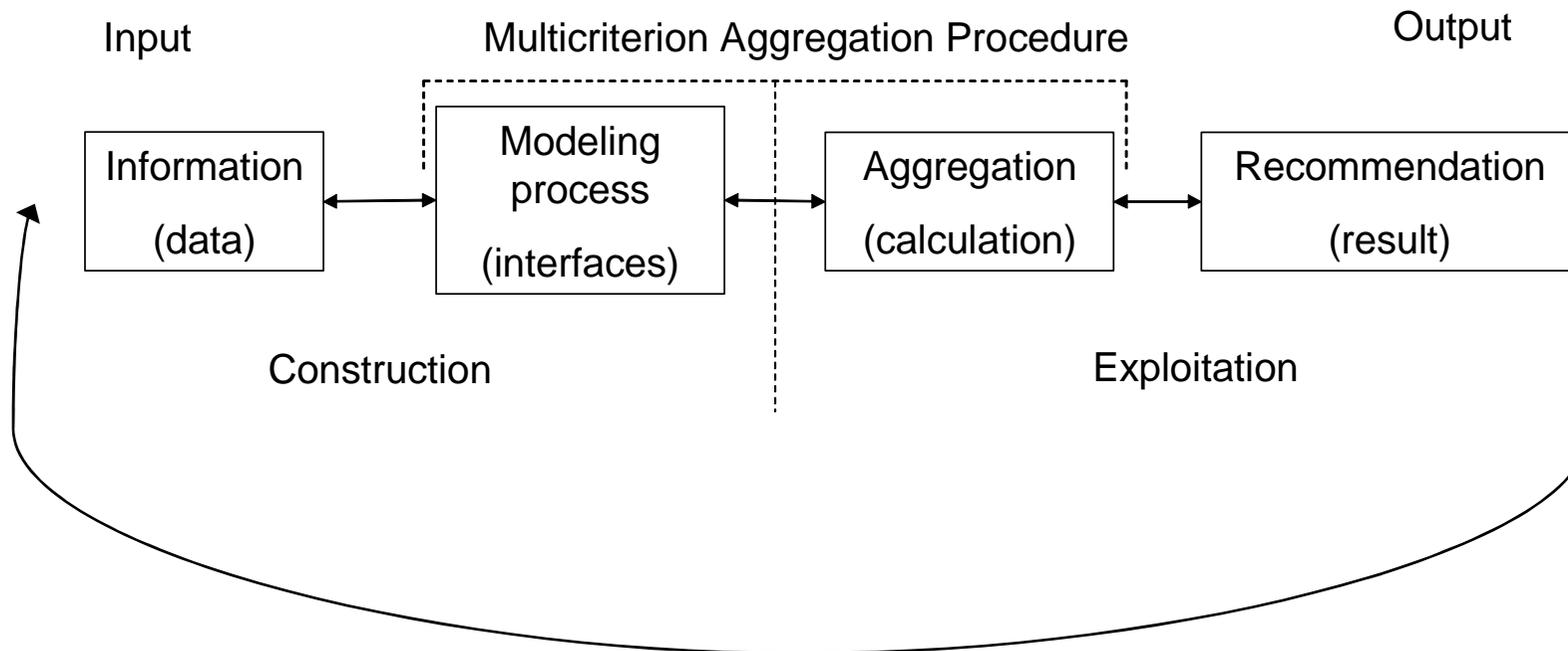
# MCA (1)

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- MCA:
  - Tools to evaluate (compare) items (alternatives) on the basis of more than one criteria or objective
  - Useful for multi-dimensional problems
- Assumptions:
  - Many criteria have a role in guiding the evolution of a system
  - Such criteria are, at least locally, in conflict with each other
  - Criteria tend to require a compromise or a choice (*arbitrage*)



# MCA (2) Phases



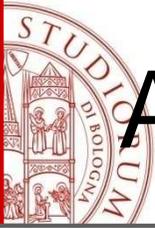
Source: Guitouni and Martel, 1998, modified



# MCA (3)

## Multi-criteria aggregation procedure

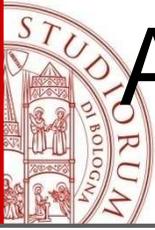
- Three main families of multi-criteria aggregation procedures:
  - a) Elementary methods
    - a simple criterion of the choice is used (Sum, Lexicographic, Maxmin, Maxmax)
  - b) Single synthesising criterion
    - the preference is based on choice of alternative that provides the higher DM utility function
    - corresponding to the sum/products of the utility provided by all criteria or by the lower distance with respect to ideal situations
    - full compensatory
  - c) Outranking method
    - introduce aggregation procedures based on concordance or discordance concepts (Hayashi, 2000).
    - preference structure more articulated (strict or weak preferred) >>> identifying thresholds of concordance or discordance index
- Fuzzy approach (applied to the existing MCA aggregation procedure)
  - concept of fuzzy sets
  - each value a degree of membership to a specified set (between 0 and 1)



# Application to policy evaluation (1)

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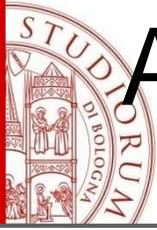
- Wide literature of application of MCA to the policy evaluation
- From project evaluation to policy evaluation
- Crucial points:
  - setting the problem
  - identification and quantification of evaluation criteria
  - weighting
  - results interpretation and analysis



# Application to policy evaluation (2)

## Setting the evaluation problem (1)

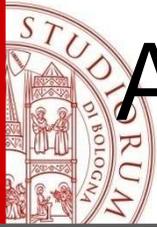
- MCA applied to policy analysis
  - used to support decision making regarding alternative project/policy options
  - based on a comparison of the performance of a policy (efficiency, effectiveness or cost-effectiveness)
- MCA applied to:
  - a) ex-ante:
    - compare/rank project alternatives in order to decide which one to implement
  - b) ex-post:
    - compare results among cases/areas
    - classify cases
    - compare real outcomes with expected/counterfactual/optimal outcomes
    - compare cases at different points in time.



# Application to policy evaluation (3)

## Setting the evaluation problem (2)

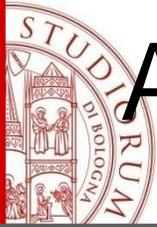
- Interaction between evaluator and Decision Maker
  - Institutional analysis
    - representation of the implementation process
    - causal relationships between policy designs and outcomes
    - understand and formulate the explanation hypothesis
    - identify the main actors involved in the policy process and those affected by the policy
    - generate the alternative options
  - Identify and adapt methodology/methods
    - role of Decision Maker in the evaluation (interactive methods vs. non-interactive methods)
    - level of complexity and transparency required in the process
    - quality and robustness of information available



# Application to policy evaluation (4)

## Identification and quantification of evaluation criteria

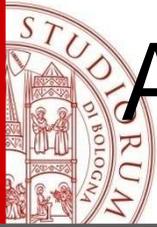
- Evaluation criteria are aimed at quantifying the consequences of alternative actions
- Characteristics:
  - exhaustiveness: all relevant criteria belonging to economic, environmental & social factors must be considered
  - consistency: the overall judgment of DM shall be coherent with the preferences, according to the criteria
  - non-redundancy: to avoid duplication and overlapping of criteria.
- Measured through indicators:
  - outputs
  - outcome/Results
  - impacts



# Application to policy evaluation (5)

## Weighting

- Weights represent the relative importance of each criterion in determining the social welfare associated to each alternative
- Weighted vs. un-weighted methods
- Several approaches are used to elicit weights
  - ranking criteria; rating methods; verbal statement; paired comparison
- Problems:
  - identification of relevant DM /stakeholders/ actors
    - policy makers are target respondents >>> expected to interpret the collective preferences
    - public could be interviewed in a contingent valuation style
    - include several groups of stakeholders/actors (farmers, consumers..)
  - eliciting weights when several groups are involved
    - group-based
    - individual-based



# Application to policy evaluation (6)

## Results interpretations

- Reading and discussing with the DM/actors/stakeholders could be useful to revise the MCA evaluation process
  - include/exclude indicators
  - add additional effects
  - add or remove alternatives
  - use different aggregation procedures
  - use a different criteria prioritisation (weights)
- Interpretation means answering the following questions:
  - altogether are the results stable and trustable?
  - what are the determinants of the results?
- ‘Trustability’ and stability of the results:
  - sensitivity analysis
  - scenario analysis
- Determinants of the results
  - classifying alternatives according to design/results
  - analysing components of the final result/score >>>> understand the determinants



# Discussion

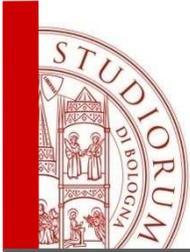
- Several MCA for policy evaluation (ex-ante and ex-post)
- Applications highlight room for improvement
  - difficulties in bringing a methodology from project to a policy (set of decisions)
  - common problem to the CBA but seem to suffer more when applied to wider issues.
- Literature on MCA still strongly focused on generating new algorithms (new aggregation procedure)
- Literature on MCA applied to policy evaluation increasing the attention on the significant evaluation problem (no needed to create new MCA algorithm)
- Areas where MCA needs improvement for the policy evaluation process:
  - selection of basic parameters (alternative, objective, indicators)
  - better incorporation of preferences beyond the use of weights
  - comparison of monetary costs and multi-criteria effects



# Concluding remarks

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- Several evaluation procedure are implicitly or structurally a typology of MCA problem
- MCA is particular interest/useful for policy analysis
- Development in the consistency of MCA and deployment of the decisions
- Improving the interaction between DMs & stakeholders - participative approach
- Improving the foundation of MCA in the administrative process and economic conceptualisation (monitoring and gathering of data).



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