Meta-evaluation, Meta-analysis and Evaluation Synthesis: Concepts and Experiences in the Innovation Policy Field

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Session: New Approaches to Evaluating Research Policies

Nov 2nd, 2018

Background (I)

- (Science, Technology and) Innovation policy evaluation is an increasingly recognized practice around the world
- Nevertheless, its real role in the formulation, implementation and/or maintenance of these policies are not completely known
- The “use of evaluations” are very much influenced by their results, but also by their quality (and other aspects related to its conduction)

Background (II)

- Meta-evaluation, Meta-analysis and Evaluation Synthesis are key tools to understand evaluation's results (contributions of policies) as well as its quality (evaluation practice)

Purpose

- Identify, analyze and find overlaps among the concepts of **Meta-evaluation, Meta-analysis and Evaluation Synthesis** and systematize these experiences in the (science, technology and) innovation policy field.

Main concepts (I)

META-EVALUATION is "*the evaluation of evaluation*" (Scriven, 1969)

"***the process of delineating, obtaining, and applying descriptive information and judgmental information***—*about the utility, feasibility, propriety, and accuracy of an evaluation and its systematic nature, competent conduct, integrity/honesty, respectfulness, and social responsibility*—***to guide the evaluation and/or report its strengths and weaknesses***" (Stufflebeam, 2001)

Main concepts (II)

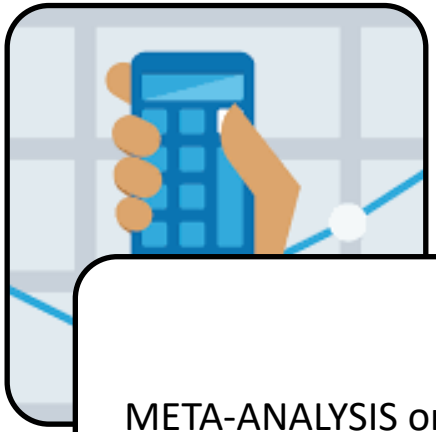
META-ANALYSIS is "*a form of quantitative synthesis of studies that address a common research question"* (Stufflebeam, 2001)

"allows an improved comparison and understanding of interventions and their effects by taking into account the results of a large number of evaluations. (...) Provided that raw-data of evaluations is made accessible, the information given in a large number of such evaluations can be used as data input for subsequent analysis." (Edler et al., 2008)

EVALUATION SYNTHESIS *as "a modified form of meta-analysis (...) to assess the overall combined effects, redundancies, contradictions and remaining bottlenecks of policy interventions"* (Edler et al., 2008)

Main concepts (III)

META-EVALUATIONS are used first to evaluate and determine which candidate comparative studies qualify for inclusion in a defensible meta-analysis database



META-ANALYSIS or EVALUATION SYNTHESIS

META-EVALUATION can and should be conducted to assess the merit and worth of the completed meta-analysis or evaluation synthesis study

Methodology (I)

SEARCH QUERY		
	SCIENCE, TECHNOLOGY, RESEARCH, R&D, INNOVATION	POLICY, PROGRAM
	META-EVALUATION, META-ANALYSIS, EVALUATION SYNTHESIS	2000-2018

1st

DATABASE	NUMBER OF PAPERS
SCOPUS	304
WEB OF SCIENCE	445
SCIELO	93

2nd

Methodology (II)

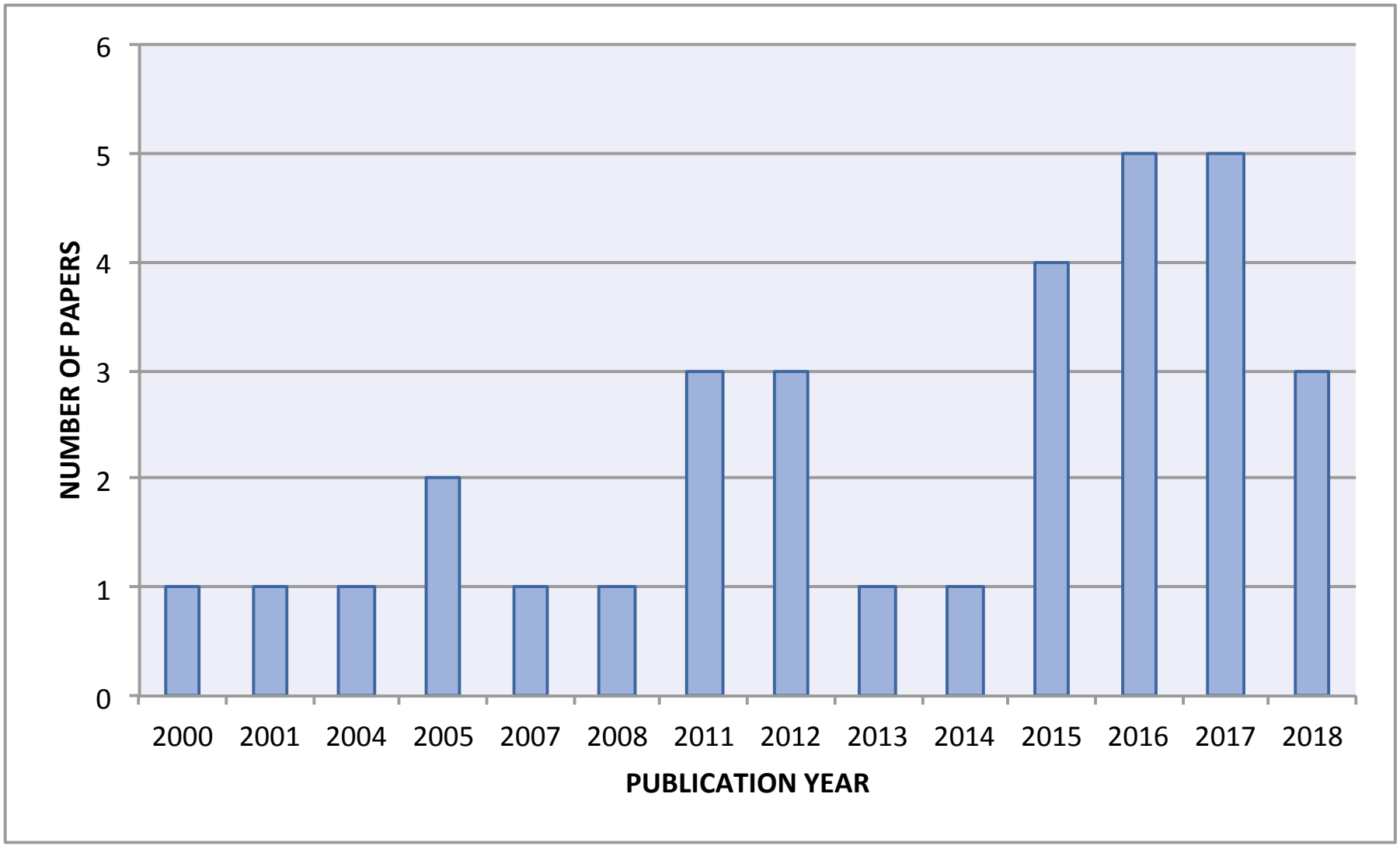
3rd

DUPLICATION ELIMINATION → ABSTRACT READING → FULL TEXT READING → 32 PAPERS

4th

Characterization

RESULTS (I)


NUMBER OF PAPERS
0
1
2
3
4
5
6
2000
2001
2004
2005
2007
2008
2011
2012
2013
2014
2015
2016
2017
2018
PUBLICATION YEAR

RESULTS (II)

JOURNALS

- 26 different journals (for 32 papers)
- Research Evaluation: 7 papers
- Other journals: 1 paper each
  - Including journals in STI field such as: Science & Public Policy; Technological Forecasting & Social Change; Research Policy; International Journal of Innovation and Technology Management

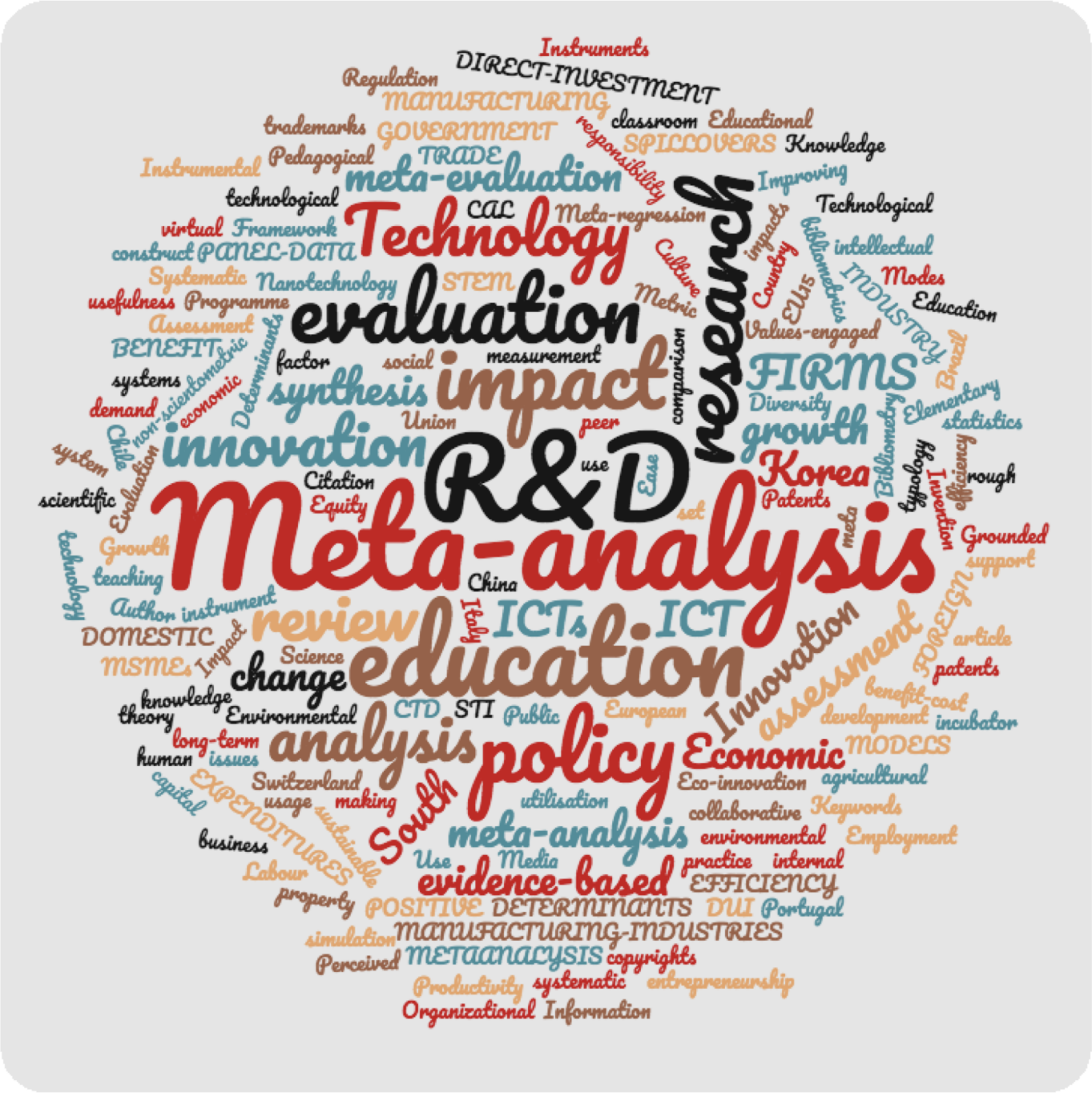
AUTHORS

- 89 different authors (for 32 papers)
- 5 of them with 2 publications
  - Edna Solomon*
  - Erik Arnold
  - Jari Hyvärinen
  - Mehmet Ugur*
  - Patrik Gustavsson Tingvall

(* co-authors)

RESULTS (III)

WORD CLOUD WITH KEY WORDS



RESULTS (IV)

- 11 Meta-analysis
- 11 Evaluation Synthesis
- 7 Meta-evaluation
- 2 Meta-evaluation + Meta-analysis
- 1 Meta-evaluation + Evaluation Synthesis

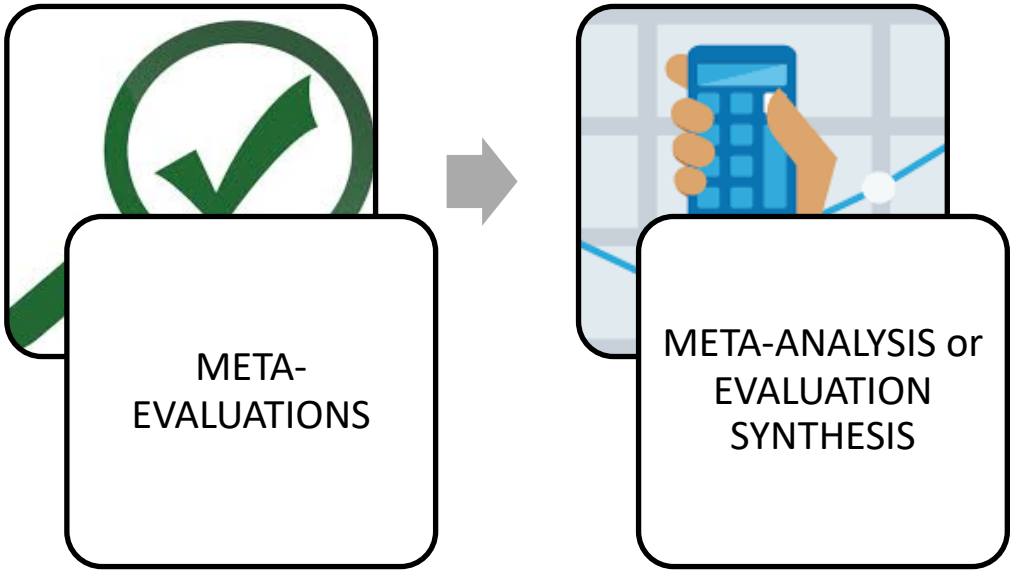
META-ANALYSIS	Independent variables	Dependent variables	Scope
Alston et al. (2000)	Agricultural R&D expenditure	Return rates	World
Mahmood et al. (2001)	Information technology (IT) usage at organizations	Information technology (IT) effectiveness at organizations	World
Garcia-Quevedo (2004)	Public R&D funding	Firm R&D expenditure	World
Mebratie et al. (2013)	Economic development	Firm heterogeneity and productivity	World
Archer et al. (2014)	Information communication technology (ICT)	Learning	World
Ghisetti & Pontoni (2015)	Policy and R&D expenditure	Environmental innovation	World
Ljungwall et al. (2015)	R&D expenditure	Economic growth and innovation in firms	China
Kokko et al. (2015)	R&D expenditure	Economic growth	Europe
Kwon et al. (2016)	K12* Invention Education	Attitudes toward invention, science, and technological problem solving	South Korea
Ugur et al. (2016)	R&D expenditure	Firm/industry productivity	World
Ugur et al. (2018)	Technological Innovation	Employment	World

* shortening of kindergarten through twelfth grade

EVALUATION SYNTHESIS	Independent variables	Dependent variables	Scope
Soetanto (2005)	Support, economic conditions, culture, technology capability, type and type of support provided by incubators	Incubator's performance	World
Hyvärinen & Rautiainen (2007)	Public R&D funding (by TEKES)	Inputs, results, direct effects and impacts on the national economy and society	Finland
Motoyama & Eisler (2011)	Use of bibliometry	Nanotehcnology assessment	World
Hyvärinen (2011)	Public research, development, and innovation (R&D&I) funding	Inputs, activities, results and impacts on firm's innovation	Finland
Sánchez et al. (2011)	Information communication technology (ICT)	Educational systems	South-Korea
Arnold (2012)	Framework Programme	Longer term effects	Europe
De Beer (2016)	Intellectual Property	Economic performance of a country's innovative sectors	World
Apanasovich (2016)	Modes of innovation	Firm's innovation performance	World
Carmona et al. (2016)	Information communication technology (ICT)	Educational processes	Mexico
Ilavarasa (2017)	Information communication technology (ICT)	Growth of micro, small, and medium enterprises	World (low- and middle-income countries_
Ibarra et al. (2017)	Information communication technology (ICT)	Education	Latin-America

META-EVALUATION	Theme	Type of Analysis	Scope
Edler et al. (2012)	Innovation Policies	Design and Quality	Europe
Ancaiani et al. (2015)	Research at Universities	Design and Use of Results	Italy
Felix et al. (2017)	Higher Education	Quality and Use of Results	Brazil and Portugal
Boyce (2017)	Undergraduate Research in Science and Technology Centers	Design and Quality	USA
Weißhuhn et al. (2017)	Agricultural Research	Design	World
Cheng et al. (2018)	Health Research	Design, Quality and Use of Results	World
Knudsen (2018)	Pesticides Policies	Use of Results	Dinamark

META-EVALUATION + META-ANALYSIS	Theme	Type of Analysis	Scope
Arnold et al. (2005)	Framework Programme	Design and Quality	Europe
Raitzer and Kelley (2008)	Agricultural Research	Design	World
META-EVALUATION + EVALUATION SYNTHESIS			
Good (2012)	Collaborative research funding (Swiss Innovation Agency)	Design and Quality	Switzerland



RESULTS (V)

THEMES

- Effects of R&D expenditure/research funding on different aspects (mainly in firms and economic performance)
  - *4 papers oriented to agricultural research/policies*
  - *2 papers about EU Framework Program*
  - *2 papers about initiatives of Research and Innovation Agencies – TEKES in Finland and the Swiss Innovation Agency in Switzerland*
  - *10 papers on other issues related with this main theme*
- Effects of ICTs on different aspects (mainly in education) (6 studies)

RESULTS (V)

SOURCES

- Papers and reports
- Academic databases, selected journals, repositories, web

METHODS

- Meta-analysis using mostly *meta-regression* (exam of the impact of moderator variables on study effect size using regression-based techniques)
- Evaluation synthesis using mostly descriptive statistics and qualitative analysis
- Meta-evaluations mainly oriented to investigate the design of evaluations and secondly, its quality and use
- 2 papers using meta-evaluation as a previous step to conduct meta-analysis/evaluation synthesis

FINAL REMARKS

- In spite of being important tools to understand evaluation's results (contributions of policies) as well as its quality (evaluation practice), Meta-evaluation, Meta-analysis and Evaluation Synthesis **still** have restricted use in STI field.
  - Maybe increasing in the next years... (such as happens in health field)
- Papers do not report **use of research results**, although they consider their findings very useful for **policy-making.**
- Papers report major limitations of their research, mainly related to amount and quality of information used.
- Our study limitation: Bias by using only research papers and also through search queries and academic databases used.

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http://www.ige.unicamp.br/spec/

THANK YOU