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DIPARTIMENTO DI
AGRARIA

SOCIAL LIFE CYCLE ASSESSMENT IN A CONSTRUCTIVIST REALISM PERSPECTIVE: A METHODOLOGICAL PROPOSAL

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PhD research project (2013 - 2016):

POSITIVISM AND INTERPRETIVISM ORIENTED PARADIGMS IN SOCIAL LCA: COMPARISON OF TWO DIFFERENT METHODOLOGICAL APPROACHES APPLIED TO AGRICULTURAL PRODUCTS.

PHD RESEARCH PROJECT

1. Critical review of about 120 papers on sLCA
2. Research paradigms in sLCA
3. Development and comparison of two methodologies from opposite paradigms:
 - ▶ post-positivism oriented
 - ▶ **constructivist realism oriented**

- ❖ A constructivist realism paradigm for sLCA
- ❖ Structure of the methodology
- ❖ Case study
- ❖ Methodological steps
- ❖ Expected results

What is a scientific paradigm?

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A "basic belief system or worldview that guides the investigator" (Guba & Lincoln, 1994:105).
A paradigm answers three fundamental questions (Guba, 1990):

- What is the nature of «reality»? (ontology)
- What is the nature of the relationship between the inquirer and the knowable? (epistemology)
- How to find out knowledge? (methodology)

“**Questions of method are secondary to questions of paradigm**, [...], not only in choices of method but in ontologically and epistemologically fundamental ways” (Guba & Lincoln, 1994:105).

Positivism-oriented paradigms dominate in the so called “hard sciences” (Tacconi, 1998).

In sociological theories it is difficult to recognize one dominant paradigm and **more worldviews** can be hold simultaneously (Batty, 2008; Tashakkori & Teddlie, 2010).

Sociology is considered a **multiparadigmatic** science (Ritzer, 1975; Corbetta, 2003; Batty, 2008; Bailey, 2008).

Post-positivism vs Constructivist realism

MAIN DIFFERENCES

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Paradigm umbrella	Positivism-oriented paradigms	Interpretivism-oriented paradigms
Examples	Post-positivism	Constructivist realism (Cupchik, 2001)
Ontology <i>What is reality?</i>	Critical realism . Objective reality, apprehendable, but imperfectly.	Critical relativism . Social world exists independently of either positivist or constructivist views.
Epistemology <i>How do you know?</i>	Dualism , even if not fully possible. Replicated findings are <i>probably</i> true. Explanation: prediction and control. Generalisations and cause-effect linkages.	Subjectivism . Phenomena are more clearly understood when placed in appropriate contexts. Reality can be locally and specifically constructed.
Methodologies <i>How do you find it out?</i>	Experimental, mainly quantitative , manipulative. Validation by Scientific Community. Statistical analysis. Probability sample.	Mainly qualitative and mixed methods. Constructed meanings guide the search for a coherent account of phenomena. Purposive and multipurpose sample.
Goodness or quality criteria	Statistical confidence level and objectivity in data produced.	Intersubjective agreement reached through dialogue , verified through objective data.

Sources: Guba & Lincoln (1994); Girod-Séville & Perret (1999); Cupchik (2001); McKenzie & Knipe (2006); Lincoln et al. (2011); Phoenix et al. (2013).

Social Life Cycle Assessment

- Integration social impacts in LC studies: 90's (O'Brien et al., 1996)
- Until today: no consensus on a specific methodology for sLCA
- Different methodological approaches have been set up.

Which are the differences?

- Semantic differences: performance/impact/effect
- Underlying social sustainability concepts (not always explicit)
- Perspectives of the assessment: the product/the firm, affected actors/stakeholders, public deciders/entrepreneurs, etc.
- Similar or different from LCA standardised steps (system boundaries, functional unit, etc.)

Where does come from this diversity?

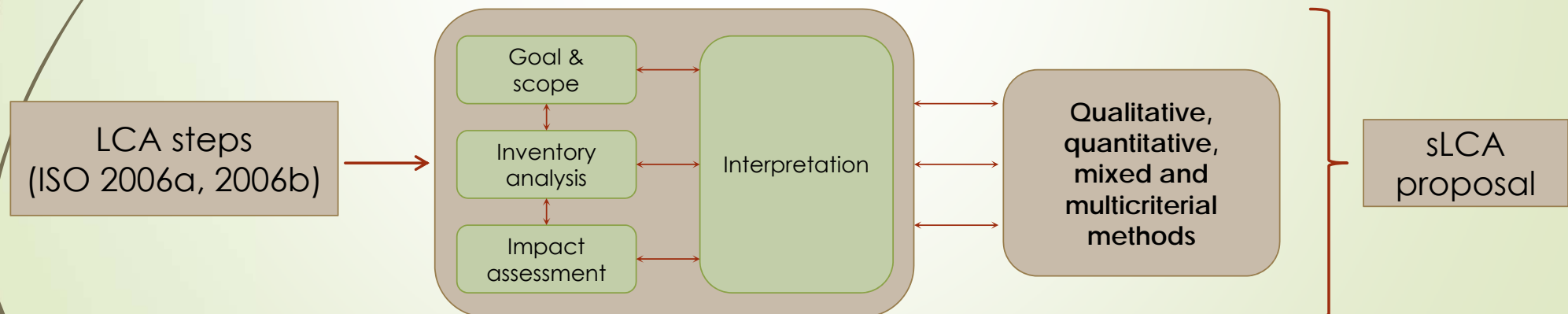
- Different paradigms exist in social sciences (Ritzer, 1975; Corbetta, 2003; Batty, 2008; Bailey, 2008; Tashakkori & Teddlie, 2010) and management sciences (Royer & Zarlowski, 2001).

Aim of the study:

Verify the constructivist realism paradigm as an epistemological option for developing sLCA.

- **Completeness**, assessing a wider variety of impacts;
- **Objectivity**, by involving external experts;
- **Legitimacy**, by involving local actors and stakeholders as active subjects in an iterative and inclusive process.

Patton (1999) rejects the methodological orthodoxy in favour of an appropriateness of methods



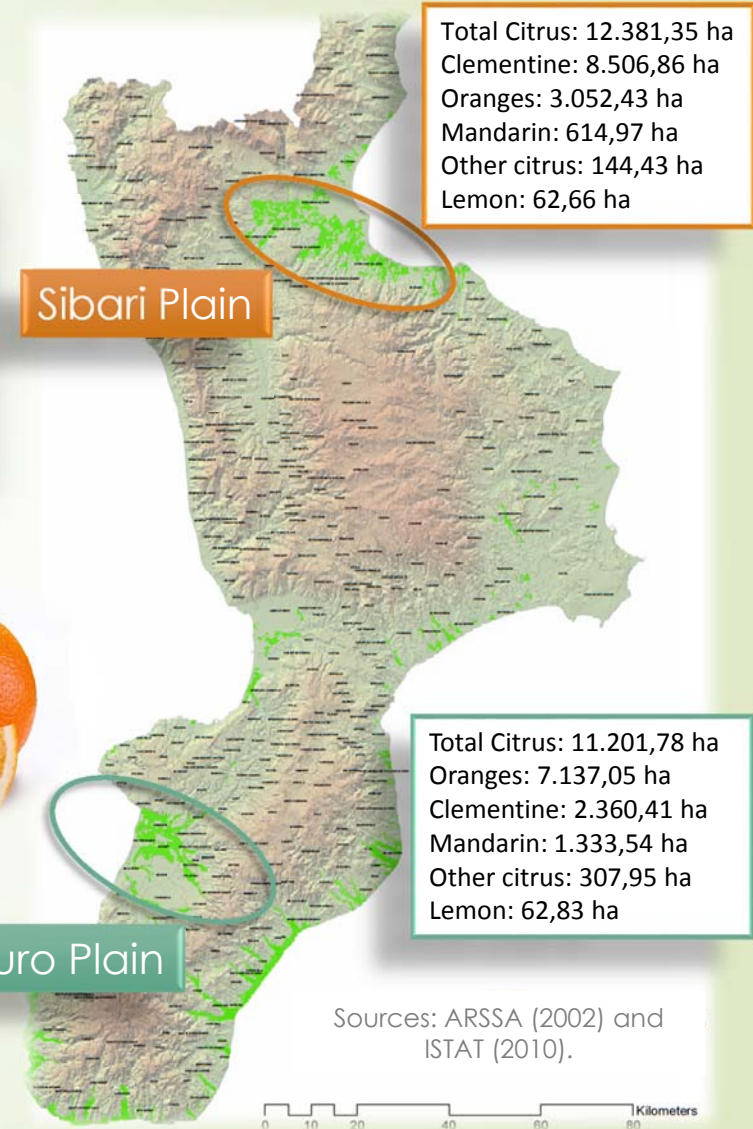
Structure of the methodology

*A purity of methods is potentially impossible in social research.
(McKenzie & Knipe, 2006)*

sLCA phase	Step	Actors involved	Activity	Tool	Expected Result
Goal and Scope	1	Researchers	Selection of stakeholders	<i>"Stakeholder theory"</i>	Typologies of affected actors
	2	Affected actors	Identification of social sustainability dimensions	<i>Q-methodology</i>	Areas of Protection (AoP), scenarios
Life Cycle Inventory	3	Independent experts	Taxonomic ordering (AoP, scenarios, criteria, indicators)	<i>Delphi</i>	Criteria and indicators tree
Impact Assessment	4	Researchers	Data gathering and calculation of indicators	Measuring	Social Impact Matrix (SIM)
Interpretation of results	5	Researchers	Normalisation and weighting	<i>AHP</i>	Ranking of scenarios



Case study: citrus growing in Calabria



Total Citrus: 12.381,35 ha
 Clementine: 8.506,86 ha
 Oranges: 3.052,43 ha
 Mandarin: 614,97 ha
 Other citrus: 144,43 ha
 Lemon: 62,66 ha

Sibari Plain



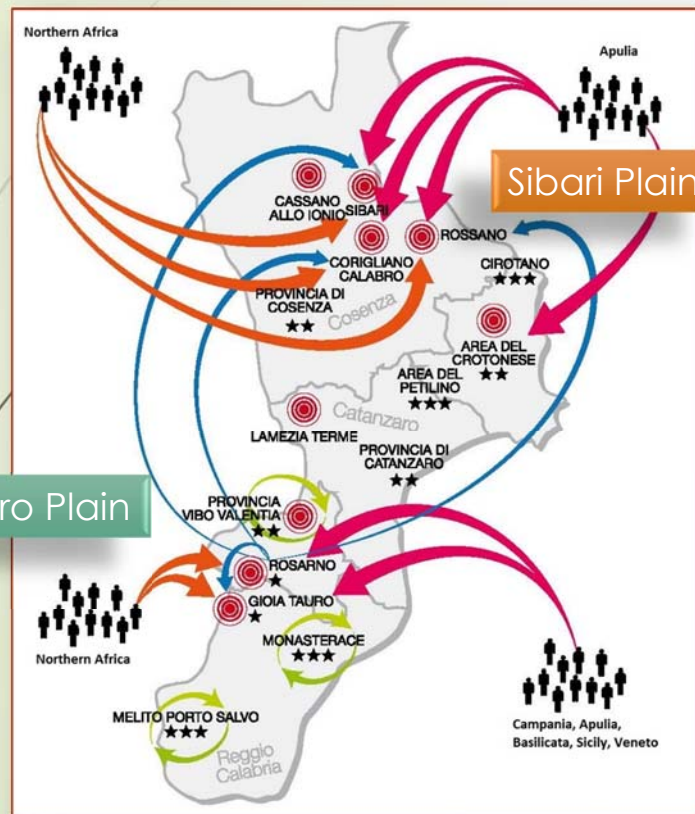
Gioia Tauro Plain

Total Citrus: 11.201,78 ha
 Oranges: 7.137,05 ha
 Clementine: 2.360,41 ha
 Mandarin: 1.333,54 ha
 Other citrus: 307,95 ha
 Lemon: 62,83 ha

Sources: ARSSA (2002) and ISTAT (2010).



Main social issues: immigrants mistreatment



Gioia Tauro Plain

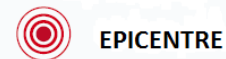
Sibari Plain

Most critical period: autumn/winter

Principal illegalities: serious working and housing exploitation, irregular labour employment, illegal recruitment of day labourers, requisition of documents.

Principal labourers' origin in risk zones: Morocco, Sudan, Senegal, Burkina Faso, Ivory Coast, Mali, Romany, Bulgaria, Albania.

RISK ZONES:



EPICENTRE

WORKING CONDITIONS:

★★★★ Good

★★★ Indecent

★ Seriously exploited

INTERNAL/EXTERNAL FLOWS

→ Transnational flow

→ Interregional flow

→ Inter-province flow

→ Commuting

Source: Osservatorio Placido Rizzotto, 2012.

1. Selection of stakeholders

Stakeholder theory (Mitchell et al., 2007):
three criteria from a normative perspective.

- ▶ their influencing power (+/-)
- ▶ the legitimacy of their relationship with the system under study
- ▶ the urgency of their claims



Examples of Life cycle phases	Influencing power		Legitimacy of relationship		Urgency of claims	
	Typology of stakeholders	score	Typology of stakeholders	score	Typology of stakeholders	score
1. Input supplying	X	(1 < n < 5)	X	(1 < n < 5)	X	(1 < n < 5)
2. Farming	Y	"	Y	"	Y	"
3. Conditioning & Transport	...	"	...	"	...	"
4. Industries	...	"	...	"	...	"
5. Wholesaling/Retailing	...	"	...	"	...	"
6. Consumption	...	"	...	"	...	"
7. Waste management	Z	"	Z	"	Z	"

2. Dimensions of social sustainability (AoP)

“Q-methodology” (Stephenson, 1953), is a tool for the analytical study of subjectivity and people’s own perspectives, meanings and opinions (Brown, 1993).

- Definition of the “concourse”
- Development of a “Q-set”
- Selection of a P-set
- Q-sorting
- Factorial analysis - PQ Method software (Schmolck, 2014)

← Most Disagree					Most Agree →					
-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
(2)										(2)
	(3)								(3)	
		(4)						(4)		
			(5)				(5)			
				(6)		(6)				
					(8)					



Scenarios hypothesis: examples

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- **Farming systems:** innovative vs traditional / organic vs conventional
- **Product:** fresh consumption vs industry
- **Farm structure:** family farms vs capitalistic farms
- **Distribution channels:** Alternative Food Networks vs mainstream supply chains

3. Taxonomic ordering of criteria and indicators

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Delphi

Delphi

- Qualitative technique
- A form of structured communication to catch expertise of participants to solve complex problems (Linstone & Turoff, 1975)
- Decision-making tool easily adaptable
- Reach consensus



Bliss et al. (1997):137, modified.

4. Social Impact Matrix (SIM)

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Dimensions of social sustainability	Sub-dimensions	Indicators	Direction	Data	Normalised data		
					Scen. 1	...	Scen. n
A	A ₁	y = f(x)	+/-	a	0 ≤ a ≤ 1	0 ≤ a ≤ 1	0 ≤ a ≤ 1
		y = f(x)	+/-	b	0 ≤ b ≤ 1	0 ≤ b ≤ 1	0 ≤ b ≤ 1
	...	y = f(x)	+/-	...	...	...	...
		y = f(x)	+/-	...	...	...	...
A _n	y = f(x)	+/-	...	...	...	...
...	...	y = f(x)	+/-	...	...	...	...
N	N ₁	y = f(x)	+/-
	...	y = f(x)	+/-
	N _n	y = f(x)	+/-	n _n	0 ≤ n _n ≤ 1	...	0 ≤ n _n ≤ 1

Source: De Luca et al. 2013, modified.

5. Weighting

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Analytic Hierarchy Process (Saaty, 1990)

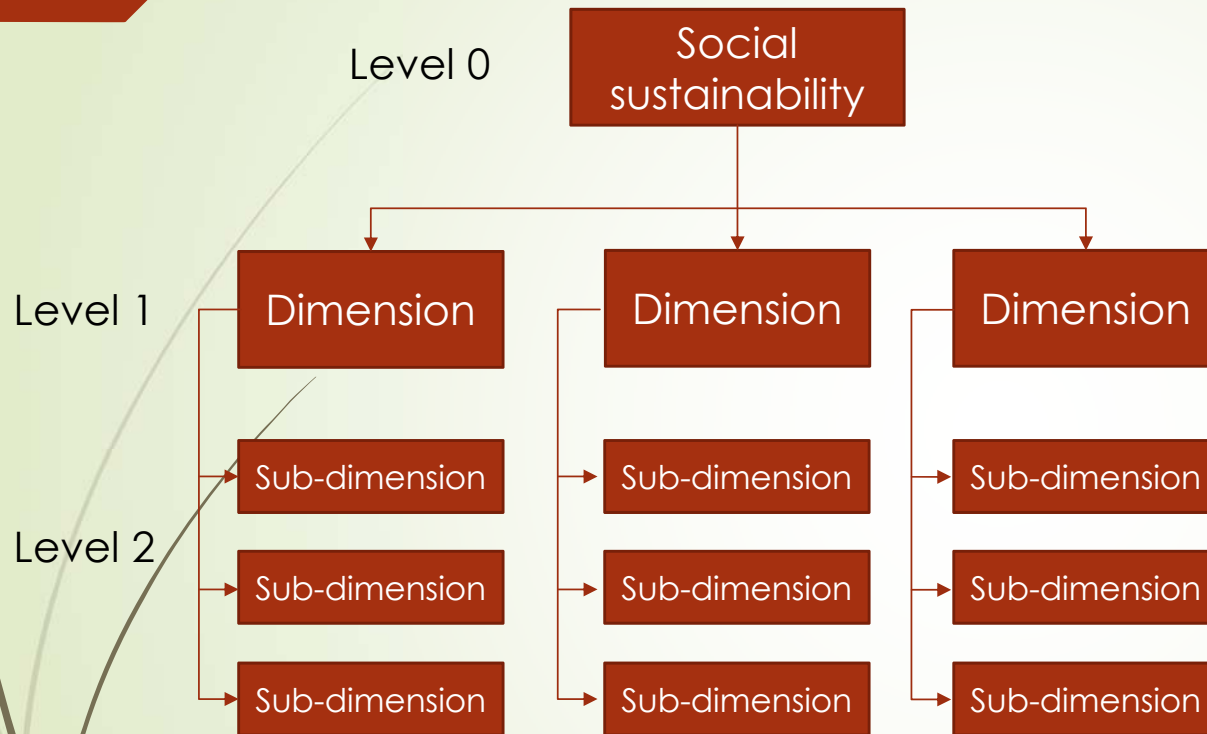
Dimensions of social sustainability	Sub-dimensions	Indicators	Direction	Data	Normalised data			Indicators Weights	Scenarios Impacts
					Scen. 1	...	Scen. n		
A	A ₁	y = f(x)	+/-	a	0 ≤ a ≤ 1	0 ≤ a ≤ 1	0 ≤ a ≤ 1	w ₁	aw ₁
		y = f(x)	+/-	b	0 ≤ b ≤ 1	0 ≤ b ≤ 1	0 ≤ b ≤ 1	w ₂	bw ₂
	...	y = f(x)	+/-	...	...	...	...	...	...
		y = f(x)	+/-	...	...	...	...	...	...
A _n	y = f(x)	+/-	...	...	...	...	...	...
...	...	y = f(x)	+/-	...	...	...	...	...	...
N	N ₁	y = f(x)	+/-	...	...	...	...	...	...
	...	y = f(x)	+/-
	N _n	y = f(x)	+/-	n _n	0 ≤ n _n ≤ 1	...	0 ≤ n _n ≤ 1	w _n	nw _n

Source: De Luca et al. 2013, modified.

5. Weighting

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Analytic Hierarchy Process (Saaty, 1990)



Example of elaboration

3	Dimension 1			Geometric Mean	Normalisation	K
	Sub-dimension 1.1	Sub-dimension 1.2	Sub-dimension 1.3			
Sub-dimension 1.1	1	5,00	3,00	2,47	0,64	0,98
Sub-dimension 1.2	0,20	1	0,33	0,41	0,10	0,94
Sub-dimension 1.3	0,33	3,00	1	1,00	0,26	1,12
Total	1,53	9,00	4,33	3,87	1,00	3,04

Consistency Index $(3,04-3)/(3,04-1)$

Consistency Ratio $CI/0,58$

Matrix order	1	2	3	4	5
Consistency	0,00	0,00	0,58	0,90	1,12

Step 1: Decomposition of decision problem into a hierarchical structure

Step 2: Paired comparison

Step 3: Synthesis of priorities

Expected results

Constructivist realism paradigm

Strengths

Rich in meaning and values
Holistic
In-depth investigation
Comprehensive understanding

Weaknesses

Context-bound
Long and costly
Weak in generalizability
Subjective

Source: Yeganeh & Su (2005:144-145), modified.

Conclusions

- Is the constructivist realism suitable for sLCA?
- Has participation a key role in the assessment of social impacts?
- To whom and for what results would be useful?

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Thank you for your
attention!

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