Contribution of Social Network Analysis for evaluating Impacts of Science-Based Research and Innovation Program: The example of the conversion to organic farming in the Camargue

Quiédeville. Sylvain (11.24.2016)

The Impact of Research on EU Agriculture
impresa

Introduction

- Large consensus on the rationale of evaluating ex-post innovation processes and research programs:

(1) To report to stakeholders on the return to their investments

(2) To bring out improvements in research programs

- But less consensus as to how innovation processes should be assessed

  - Linear vs « dynamic » methods »

- The ASIRPA (handled by INRA) and IMPRESS projects (handled by CIRAD), endeavour to develop a “dynamic method” for evaluating research programs in agriculture

  - They conduct an Impact Pathway Analysis (IPA)

The Camargue case study

The Impact of Research on EU Agriculture
impresa

Contextual elements

- Rice is the main crop production in Camargue (in 2014: 13 000 ha, 200 farmers including 35 organic ones)
- Advisory institutions: CIRAD, INRA, FranceAgriMer, CFR, Natural Park of Camargue, Rice-Farmers Union
- A set of research projects on organic production has been implemented by the INRA and its partners from 2000 to 2015

The Impact Pathway Analysis

- Is inspired from the programme-theory (PT)

- Aims at linking investments in projects' inputs with outputs, outcomes and impacts

➢ We advocate the use of a **participatory approach-PIPA (derived from IPA)** in order to

- enhance responsiveness during evaluation process in empowering stakeholders for mobilising changes

- increase the plausibility that results will be used

The Impact of Research on EU Agriculture
impresa

General approach (1)

❖ Step 1: First overview, SNA data and collection of Impact pathway indicators, first feedback round

In-depth interviews with technical institutes, private storage companies and 15 farmers (4 organic, 7 partially-organic, and 4 conventional)

❖ Step 2: Stakeholders' pathway building

Focus groups : reconstruction of the theory of change of the programme:

(1) Identification of changes (outcomes) related to the transition to organic rice production

(2) To define how, when and where changes happened

The Impact of Research on EU Agriculture impresa

General approach (2)

❖ Step 3: Refinement of the pathway, collection of impact pathway indicators

- Completion of a table of links

❖ Step 4: Evaluation, refinement of the pathway, measurement of the Impact Pathway indicators

- By using the process tracing method
- 12 organic and partially-organic farmers were interviewed

❖ Step 5: Feedback round

Objectives of the paper

To assess:

- Whether SNA allows a deep investigation of the stakeholders' statements on relationships issues (and to validate them)
- If SNA allows alternative explanations to stakeholders' views to be identified and either confirmed or rejected
- The relevance of SNA to evaluating the impacts of the research on the resilience of the innovation system

The Social network Analysis (SNA)

- We study the stakeholders' statements (on relationships) + their effects on the system's resilience as relationships determine innovations

  ✓ This causal link is explained through the channel of social capital

  Social capital can be defined as a set of diverse entities where actors' actions are facilitated inside a given social structure (Coleman 1988)

Indicators of SNA used

Betweenness: to identify the actors with a high Betweenness (level of intermediation in the network) … of particular interest as such actors are likely to be knowledge brokers

Clustering coefficient: to help comprehend the evolution of actors' position in the whole network by calculating the level of connectivity between actors in the neighborhood

Degrees: (1) to measure the strength of relationships between each pair of actors and (2) to better understand the dynamic of the innovation

Resilience of the innovation network

Responsiveness: is estimated by the distance between actors

A little distance is likely to increase the flow of relevant information within the innovation network

Robustness: the Clustering coefficient is used to identify the "central core" of the network.
(*aggregate Degrees of the involved actors/sum total of Degrees from the overall network*)

The Impact of Research on EU Agriculture
impresa

SNA tests

T1: 4 research activities (CEBIOCA project, diverse experimentations, ORPESA "Table") → ↑influence of INRA in the actor network.
PUM (Possible Underlying Mechanism): ↑exchanges between INRA and farmers

T2: both the ↑influence of INRA and CIRAD in the actor network have substantially structured the actor network.
PUM: INRA and CIRAD were becoming an important and moderately broker, respectively

T3: the high selling price and demand growth for organic rice + the adoption of organic farming → important and ↑influence of BIOSUD in the actor network.
PUM: opportunity for BIOSUD to ↑earnings (SNA not applied here)

SNA Tests

- Test 1: Influence of INRA in the actor network

✓ The betweenness score (degree of intermediation) of INRA has evolved from 370 in 1999 and 415 in 2006 to 542 in 2014 (+46% and +31%)

✓ We can confirm the supposed underlying mechanism: ↑ relationships between INRA and farmers: ↑ of around 80% in their bilateral "degrees" (from 15 over the years 1999-2005 to 27 over the years 2010-2014)

✓ Alternative possible explanation : ↑ in relationships between the neighbors of INRA. Has been validated: ↑ of 60% of the clustering coefficient of INRA

SNA Tests

- Test 2: Role of INRA and CIRAD to structuring of the actor network

✓ ↑ influence of INRA (and CIRAD) → ↑ exchanges and links in the overall network

✓ The supposed underlying mechanism, i.e. INRA and CIRAD have become knowledge brokers: corroborated by their higher betweenness (+46% and +34%)

→ However, the betweenness of INRA has dropped about 39% during the first six years of the research program (until 2006) before it steadily increased.

→ The network has really started to be developed in 2006: the first research activity, i.e. the CEBIOCA project (2000-2004), did not directly allow the network to structure itself.

SNA Tests

- Test 3: Influence of BIOSUD to the organic supply chain

✓ SNA partially confirms the significant and rising role played by BIOSUD:

(1) ↑ of about 18% (in 2005 compared with 2003) of the overall network Clustering coefficient after BIOSUD was created

(2) ↑ of the exchanges between BIOSUD and farmers since the year 2003: the bilateral Degrees increased from 15 in 2003 to 25 in 2014

Resilience of the innovation network

- The Camargue organic network presents a better survival capacity than the conventional one

✓ Distance between actors (responsiveness): 15% lower in the organic network (1.8) than in the conventional one (2.1)

✓ Robustness: The organic network is strongly organized around the pole "BIOSUD-SudCéréales-SARL Thomas"

➡ The developed organic farming system is likely to endure over time

Discussion and conclusion

- The SNA approach contributes successfully…

  - ✓ (1) …in investigating stakeholders' statements on relationships issues

  - ✓ (2) …in analyzing the accuracy of alternative explanations to stakeholders' views

  - ✓ (3) in assessing impacts of the research on the resilience of the innovation system

Discussion and conclusion

- The reconstruction of the actor network at 6 different periods, allowed a significant deepening of the analysis,

  - ✓ For example, we could show that the CEBIOCA project (first activity) did not significantly contribute to the growing influence of INRA in the network.

- However…
  - ✓ SNA could not tell by itself what the effects of receiving information on the actors are and if their behaviors have changed and through which mechanisms.

- Generalization?
  - ✓ We believe that SNA may also be successfully applied as part of other overall approaches like ASIRPA, IMPRESS, etc.

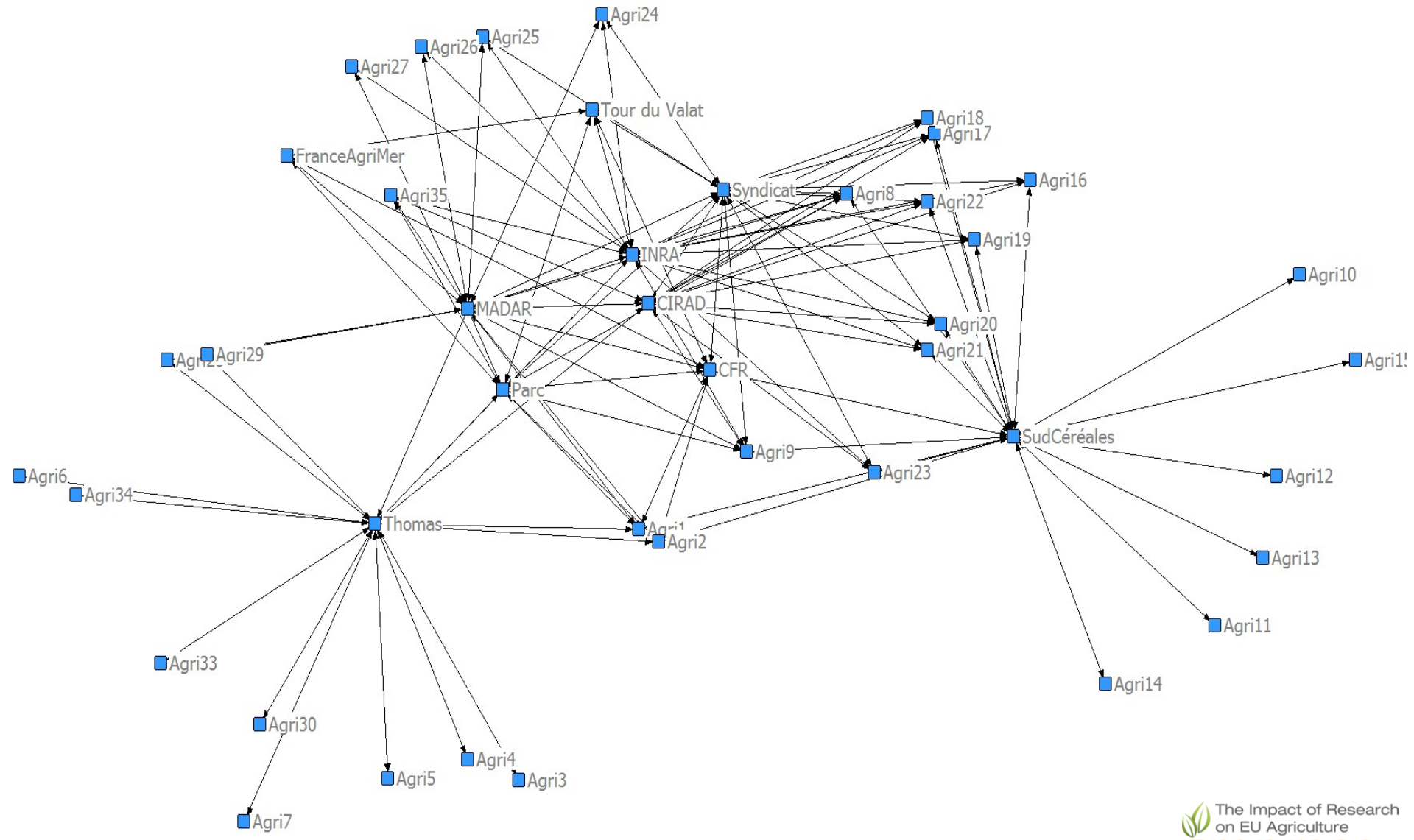
FiBL

Thanks for you attention!

Danke für Ihre Aufmerksamkeit !

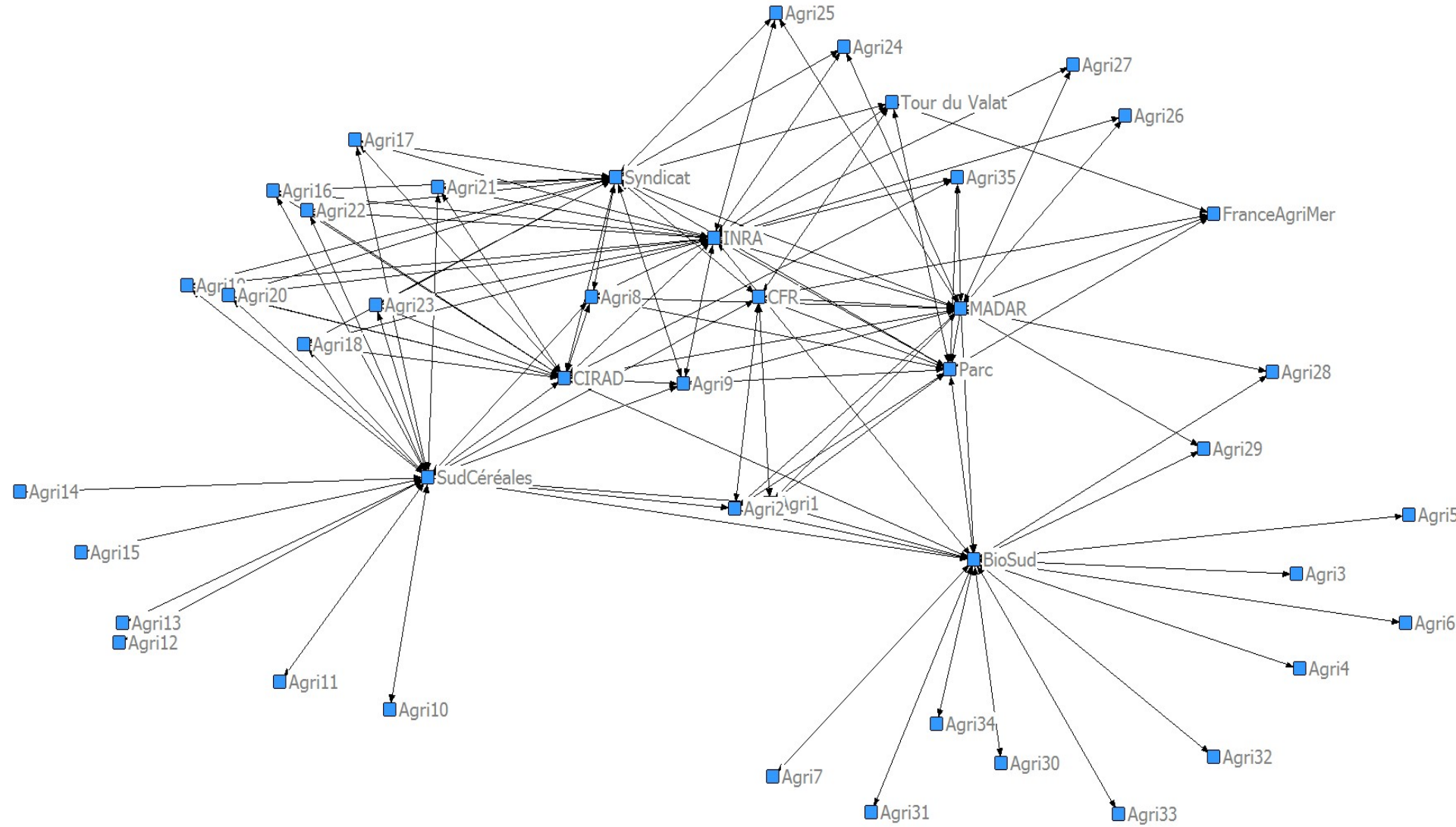
The Impact of Research on EU Agriculture
impresa

Actor Network, in 1999



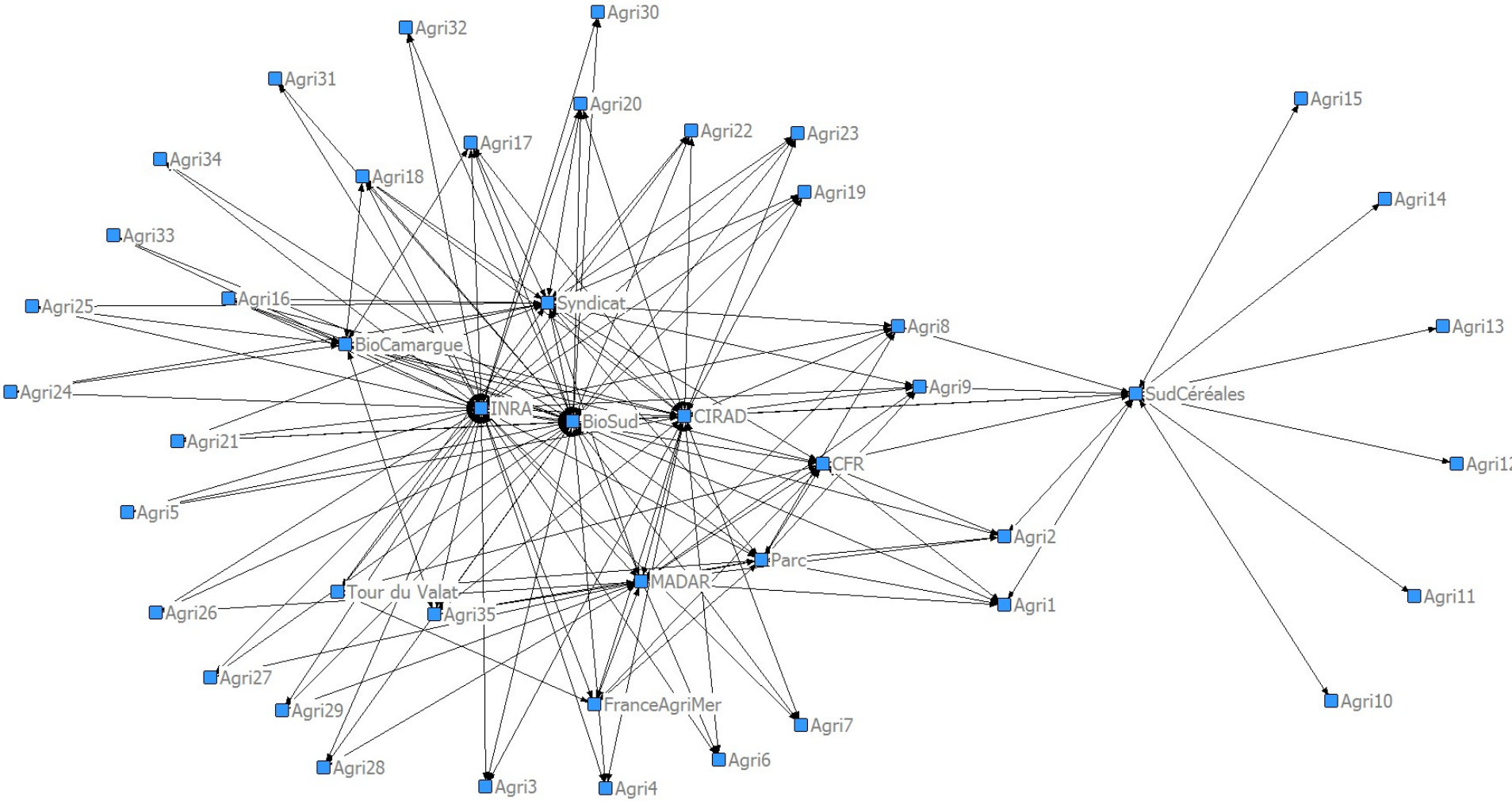
The Impact of Research on EU Agriculture
impresa

Actor Network, in 2003



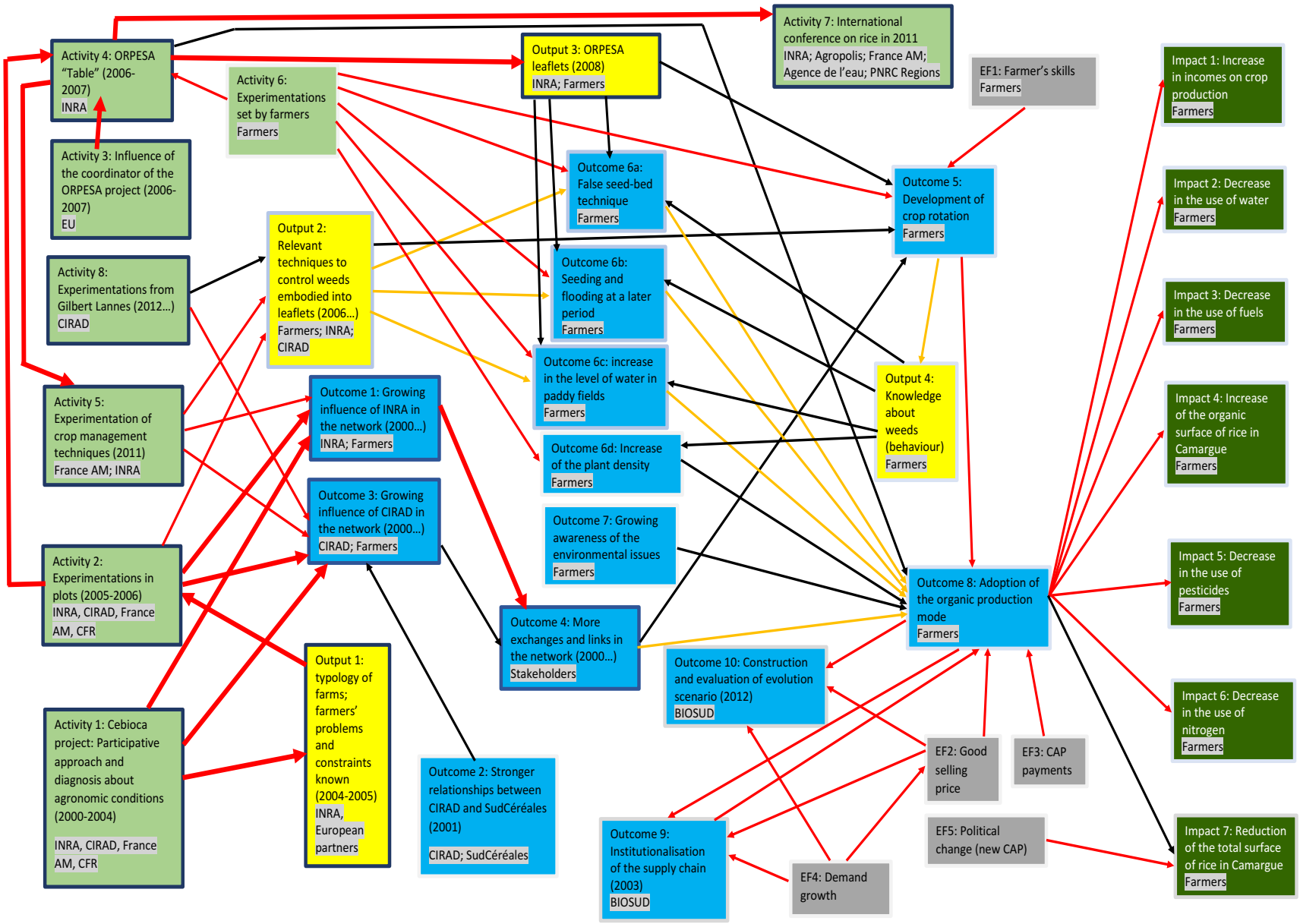
The Impact of Research on EU Agriculture
impresa

Actor Network, in 2015

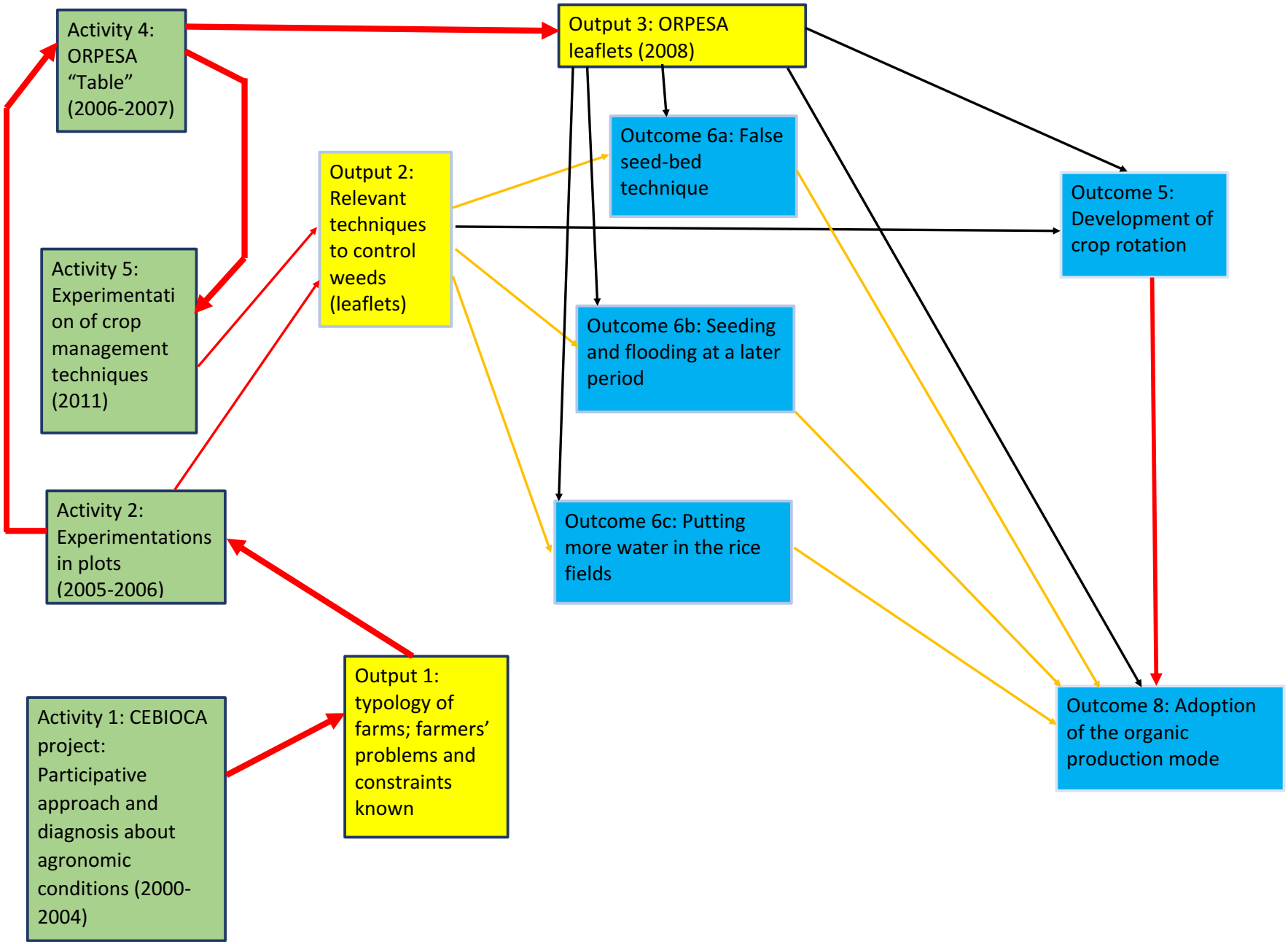


The Impact of Research on EU Agriculture
impresa

Impact Pathway



Research activities ⟹ research outputs



Research outputs ⇢ Outcomes (1)

- Incremental techniques (research outputs)
  → not seen as very relevant and adapted

  - Specific conditions in the farms

  - Farmers who hosted experimentations acknowledged more the INRA

Research outputs ⇢ Outcomes (2)

- Important role played by the “tests” conducted by farmers

- Crucial importance of external factors :

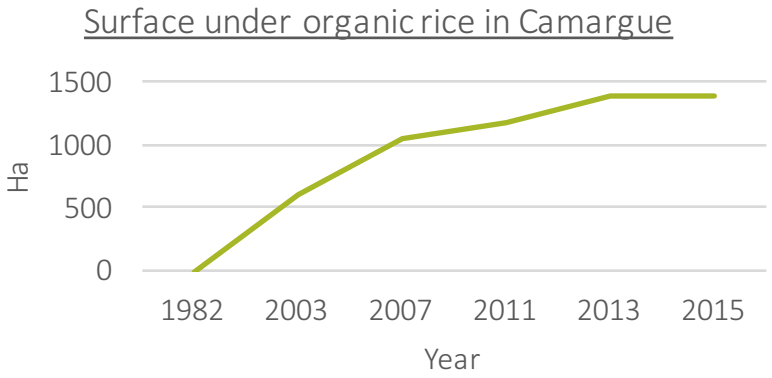
  - ✓ selling price of organic rice
  - ✓ CAP subsidies to both convert and maintain organic surfaces

The French Centre of Rice: a barrier within the innovation process

- Lack of involvement of the CFR in the research program
  - No specific research/experimentations done on organic production
  - Lack of communication/advices around organic rice

Impacts

- Indicator of change



- Expected impacts (at the Camargue level) of the technical progress initiated by the research

  - ✓ Less use of pesticides (-8%)
  - ✓ Less consumption of water (-8%) and fuel (-3%)

- Effects of the « combine incentives » from the research, the policies and the market

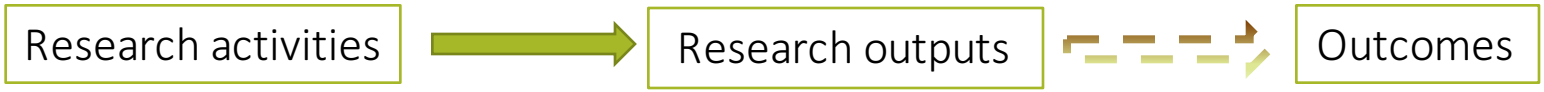
  - ✓ Increase in incomes on organic crop production: +111% (in excluding single payment entitlements)

- Induced effects

  - ✓ Decrease of the total surface dedicated to rice production (-8%)

Conclusion (case study as a whole)

- Limited role of the research from INRA and its partners



- The French Centre of Rice may be more involved

- Strategy of transferring knowledge may be improved

Discussion (1) (case study as a whole)

- The stakeholder's focus group:
  - To be flexible in focus group is a right strategy
    - However, stakeholders would have preferred to react on first results
- The diversity in focus group:
  - Many stakeholders attended the meeting
    - However FranceAgriMer (funder) did not participate
  - Stakeholders have drawn (reconstructed) the Impact Pathway + presentation in plenary
    - That said, some farmers were reluctant to do it

Discussion (2) (case study as a whole)

- SNA:
  - The reconstruction of the evolution of the relationships was successful
  - Link SNA-Innovation trend

- Analysis of the pathway:
  - The process tracing method
  - To ask counterfactual questions