

IMPACT EVALUATION WITH SOCIAL NETWORK ANALYSIS METHODS.

**PROGRAM FOR SUPPLY CHAIN
DEVELOPMENT IN THE PROVINCE OF
CÓRDOBA, ARGENTINA**

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Outline

- Evaluation Objectives
- Methodology
- Key Results
- Recommendations

Evaluation Objectives

The follow-up evaluation objectives are to:

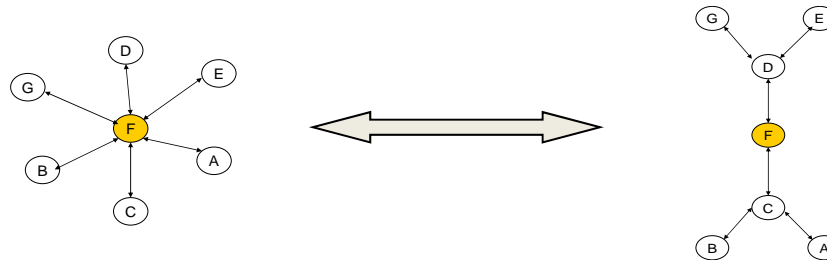
- (1) analyze the evolution of the inter-organizational networks in the electronics cluster in Cordoba;
- (2) explore the benefits of the CDP, with particular reference to the changes occurred in the inter-organizational networks;
- (3) explore whether the changes occurred in the inter-organizational networks have generated beneficial effects on the performance of firms;
- (4) draw recommendations for policy design and at suggesting best practices that can be useful for other future policy designs.

Methodology

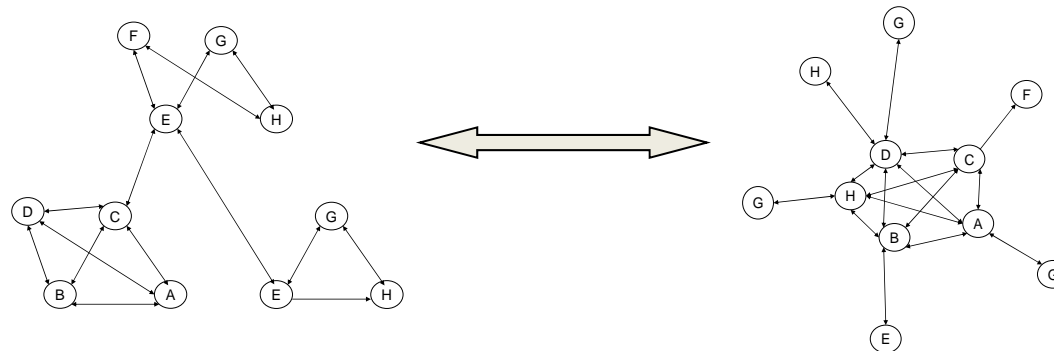
- Primary data (2005 and 2012)
- 2005: first availability of relational (network) data
- Contacted 100% of treated and untreated firms: ~ 80% response rate (22 treated and 16 untreated firms)
- Structured questionnaire w/ collection of network data
- Analyses of network data: descriptive and stochastic Social Network Analysis (SNA) methodologies.
- Focus group

Why SNA

- SNA: Measures CDP effects on Coordination
- SNA is based on graph theory:
 - It measures the position of individual actors within a network



- It measures the way linkages are distributed within a network (i.e., the network structure).



The Use of SNA in CDP Evaluations

- Visualize and analyze the evolution of one or more inter-organizational networks over time (also after the end of the policy treatment)
- Measure the changes in the centrality of actors and in the structure of the network over time (prior, during, after the CDP)
- Analyze whether given CDP projects or initiatives are associated with a higher likelihood that actors form new (or discontinue old) ties

Why SNA is Worth Doing

- SNA is a powerful tool
- It is easy to implement, with some basic training
- Typical process:
 1. Define the universe or sample of firms
 2. Design the questionnaire including relational questions
 3. Interview firms (online survey or face-to-face)
 4. Enter relational information into a $n \times n$ matrix
 5. Analyze the data
- Consultants with skills in SNA can be contracted as external advisors or for technical supplement/support

The Questionnaire in the Cordoba CDP

- Different sections to collect data about characteristics of firms, performance, perceptions about the effectiveness of the CDP, etc.
- A separate section for the collection of Social Network data:
 - *A- To which of the firms included in **List 1** did you transfer business information (e.g. technological advice, marketing advice or any other kind of information that is relevant to the business) in the period 2008-2011?*
 - *B- From which of the firms included in **List 1** did your firm receive business information (e.g. technological advice, marketing advice or any other kind of information that is relevant to the business) in the period 2008-2011?*

Please indicate the importance you attach to the information obtained in each case by marking the identified firms on the following scale:

0= none;

1= low value information, with minor impacts on your business;

2= information of moderate value;

3= information of strategic value, which generated technological change and/or better economic performance.

Excerpt of Our Roster

	EMPRESA	Q 1	Q 2
1.	ACCME SRL	3	3
2.	ALARMAS KEEPER	2	1
3.	ALARMIC		
4.	Altel srl		
5.	ARIES CIRCUITOS IMPRESOS		
6.	BOS ELECTRONICA		
7.	BRUNELLI		
8.	CEC ELECTRONICA SRL		
9.	CEM SRL		
10.	COINTECH SA		
11.	COMPONEX		
12.	CONCORD		
13.	CONSULFEM SA		
14.	CONT. AUTOM P/ IND		
15.	CONTROL NET		
16.	CORMED ELECTROMEDICINA		
18.	CYEL		
19.	DEV Servicios		
20.	DEXEL		
21.	DIGITEK SA		
22.	DISCAR SA		
23.	DITEL SRL		
24.	DTA.SA		
25.	ECUST		
26.	ELECTRO ALARMAS		
27.	ELECTRONICA DEL AUTOMOTOR		
29.	ELECTRONICA MEDITERRANEA SA/PENTACOM		

From Roster to Matrix

UCINET Spreadsheet - K:\ADDB\Cordoba\ANALYSIS\UCINET\Red_Ca_Tb.##h

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	E6	NNE1	E38	E30	E2	E15	E27	E10	E18	E39	NNE2	NNE3	NNE4	NNE5	NNE6	NNE7	NE45
E6	0	0	0	0	0,5	0	0	0	0	0	0	0	0	0	0	0	0
NNE1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
E38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E30	0	0	0	0	0	0	0	0	0	0	0	0	0	0,5	0	0	0
E2	0,5	0,5	0	0	0	0	0	0,5	0	0	0	0	0,5	0	0	0	0
E15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E27	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
E10	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0
E18	0	0	0	0	0	0	0	0	0	1	2	0	0	3	1,5	3	0
E39	0	0	0	0	0,5	0	0	0	0,5	0	0	0	0	1,5	0	1,5	0
NNE2	0	0	0	0	0	0	0	0	2	0,5	0	0	0	0	0	0	0
NNE3	0	0	0	0	0	0	0	0	0	0	2,5	0	0	0	0	0	0
NNE4	0	0	0	0	0,5	0	0	0	0	0	0	0	0	0	0	0	0
NNE5	0	1,5	0	0,5	0	0	0	2	3	2,5	0	0	0	0	0	0	0
NNE6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE7	0	0	0	0	0	0	0	0	3	1,5	1	0	0	0	0	0	0
NE45	0	0	0	0	0,5	0	0	0	0	0	0	0	0	0	0	0	0
NNE8	0	0	0	0	0	0	0	0	2,5	0	0	0	0	0	2,5	0	0
NNE9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E22	0	0	0	0	0,5	0	0	0	0	0	0	0	0	0	0	0	0
E16	2,5	0	0	0	0	3	0	2	3	2	1,5	0,5	0	3	0	2	0
NS16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE13	0	0	0	0	2	0	0	0	0	0	0	0	0	0,5	0	0	0
E4	0	0	0	0	0	0	0	0	0,5	0	0	0	0	0	0	0	1
NNE14	0	0	0	0	0	0	0	0	0	1,5	0	0	0	0	0	0	0
A4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0,5	0
A3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E21	0,5	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
NNE15	0	0	0	0	0	0	0	1,5	0	0	0	0	0	0	1,5	0	0
NNE16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E20	0	0	0	0	0	0	0	0,5	1	0	0	0	0	0	0	0	0
E3	0	0	0	0	0	0	0	0,5	0	0	2,5	0	1	0	0	0	0
NNE19	0	0	0	0	0	0	0	0	0	0,5	0	0	0,5	0	0	0	0
NE51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E12	0,5	0	0,5	1	0,5	0	0	1,5	1,5	1	0	0	2,5	1	0	0	0
E23	0	0	0	0	0	0	0	0	0	0	0	0	0	0,5	0	0	0
NNE21	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
E1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE53	0	0	0	0	0	0	0	0	0	0	0	0	0,5	0	0	0	0
E7	0	0	0	0	0	0	0	3	2	1,5	0	0	3	0	0	0	0
NNE23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

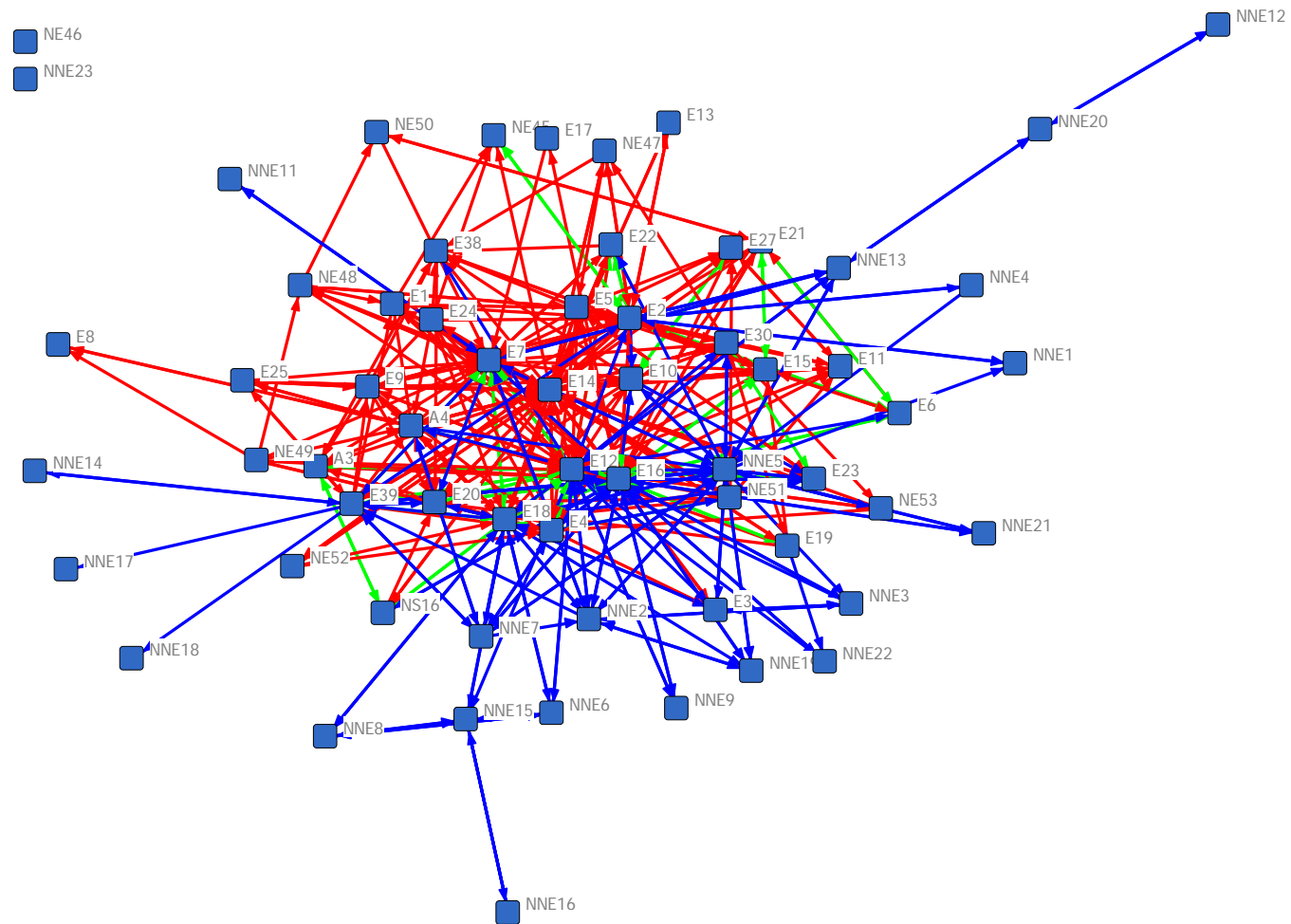
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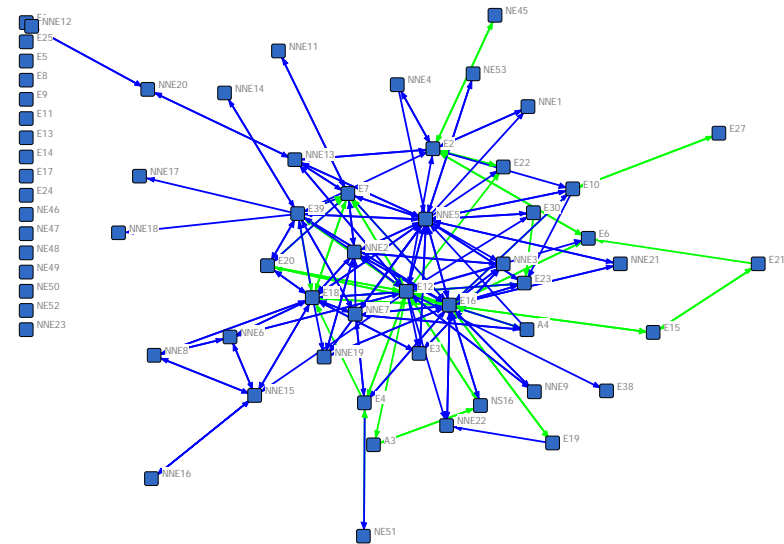
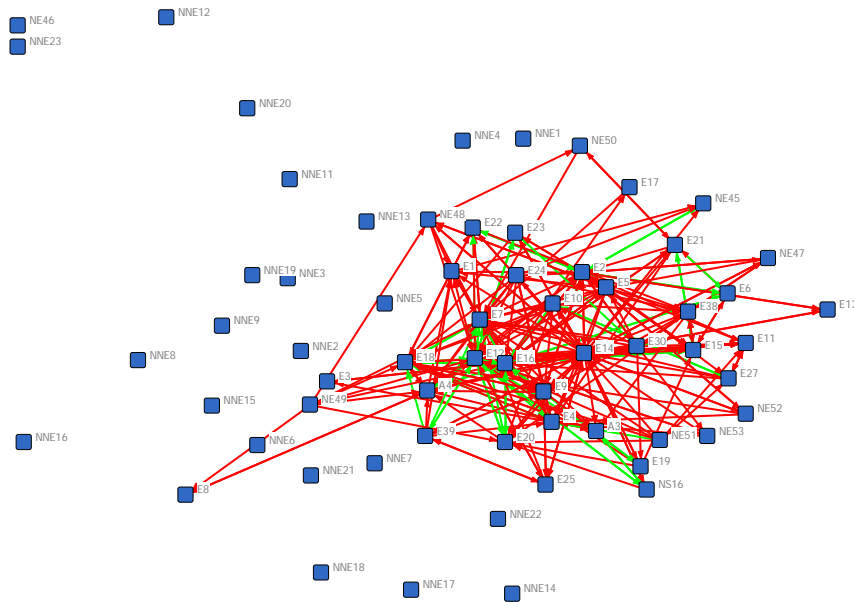
Firm NNE5 transfers strategic information to E18

Changes over Time



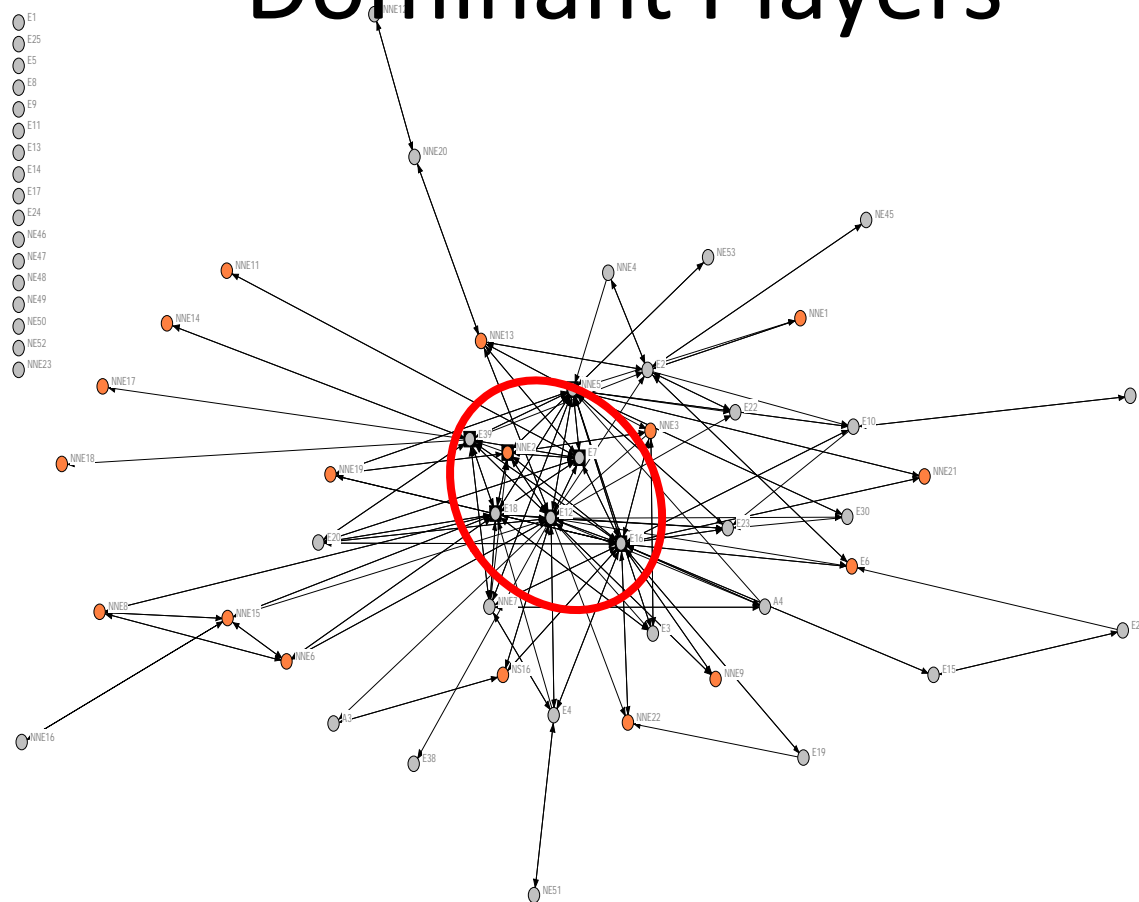
2005

2012



- Reduction of density (from 0.17 to 0.09) is due to selectivity
- Stabilization of some existing ties (green) + new ties (blue)
- Growing centralization, with central actors being *mainly* the same firms (Dominant Players)

Dominant Players

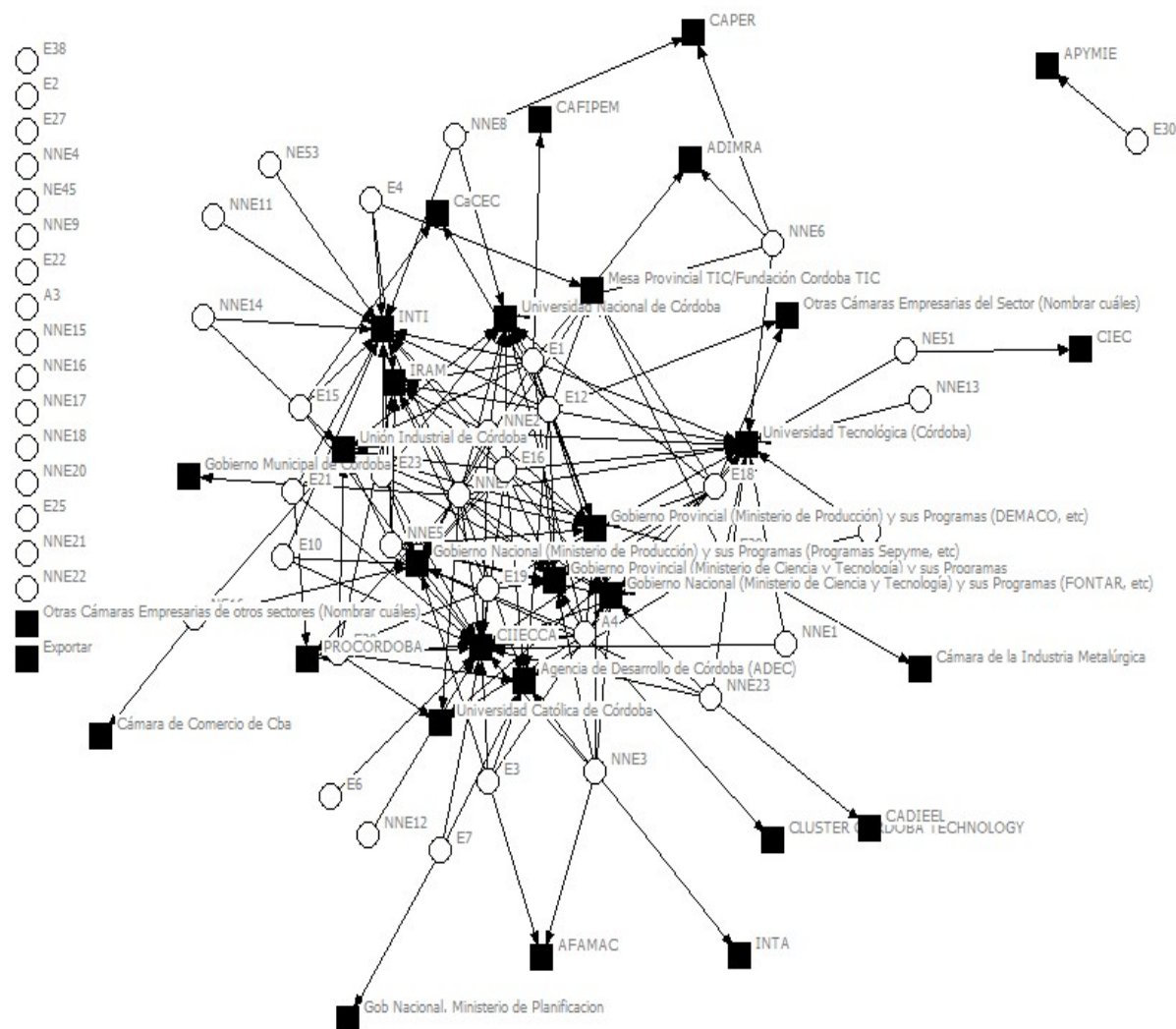


- Mainly medium-sized firms, rooted in the cluster, technology leaders in their niche markets (at the local level)
- Active members of the CII-ECCA (often with directive responsibilities)
- Generate relevant spillovers to untreated firms (indirect beneficiaries in orange)

Is CDP Related to New Ties?

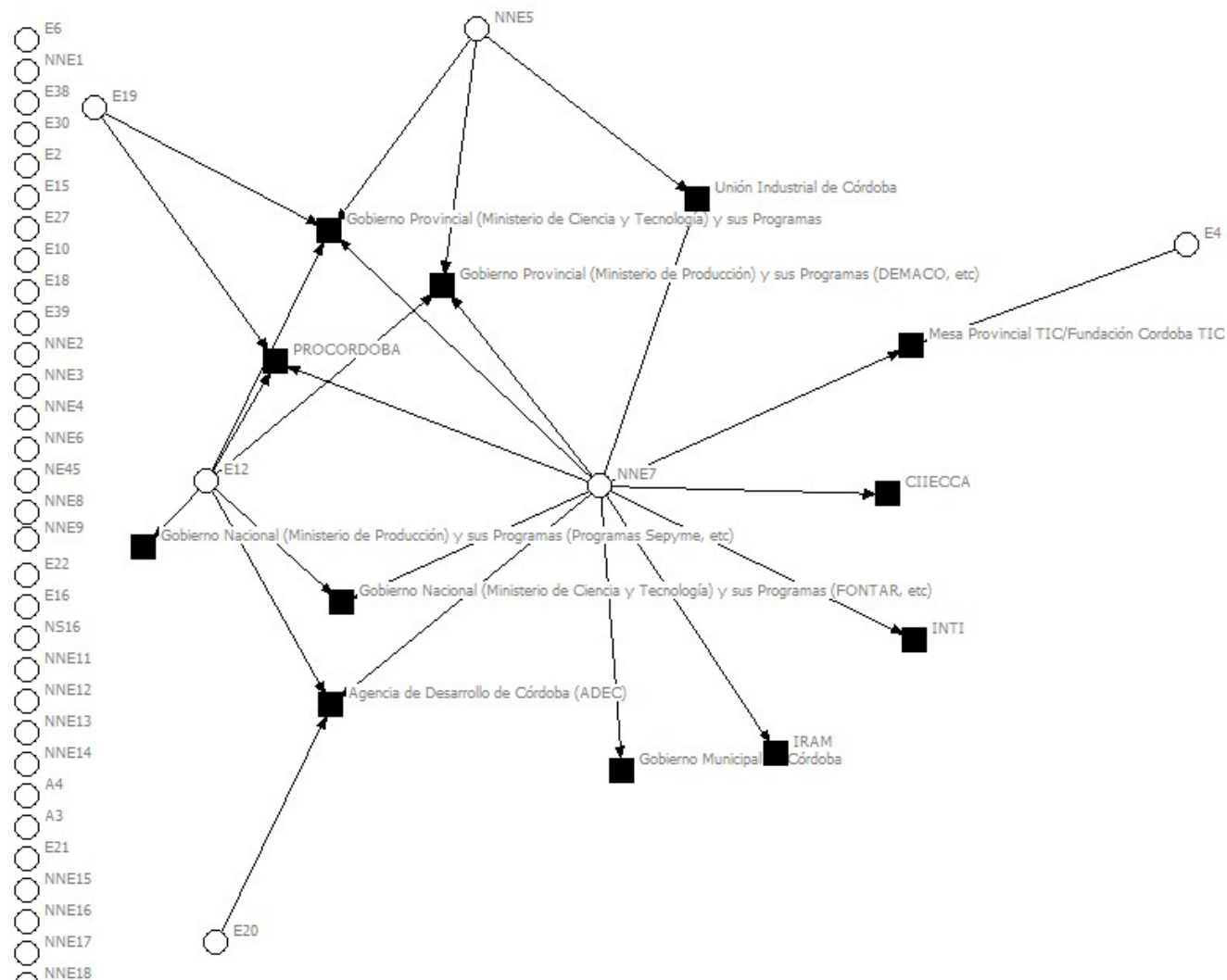
- Stochastic Actor Oriented Model (SAOM) Analysis shows:
- The activities that promoted more inter-firm ties were:
 - *Centro de Abastecimientos Comunitarios y Desarrollo de Proveedores*
 - Strategic Planning Workshops (*Talleres de planificacion estrategica*, meant to define firms' future strategies and long-term activities for the development of the industry.)
- Firms that participated in 'institutional activities' (i.e. heterogeneous initiatives to promote the CIIECA, match-making between firms with similar interests, to increase the visibility of the sector within the local social context) were less likely to form new ties
- This kind of analysis is possible only if there are at least 2 waves of relational data

Technology-transfer linkages to Public/Private Local Institutions



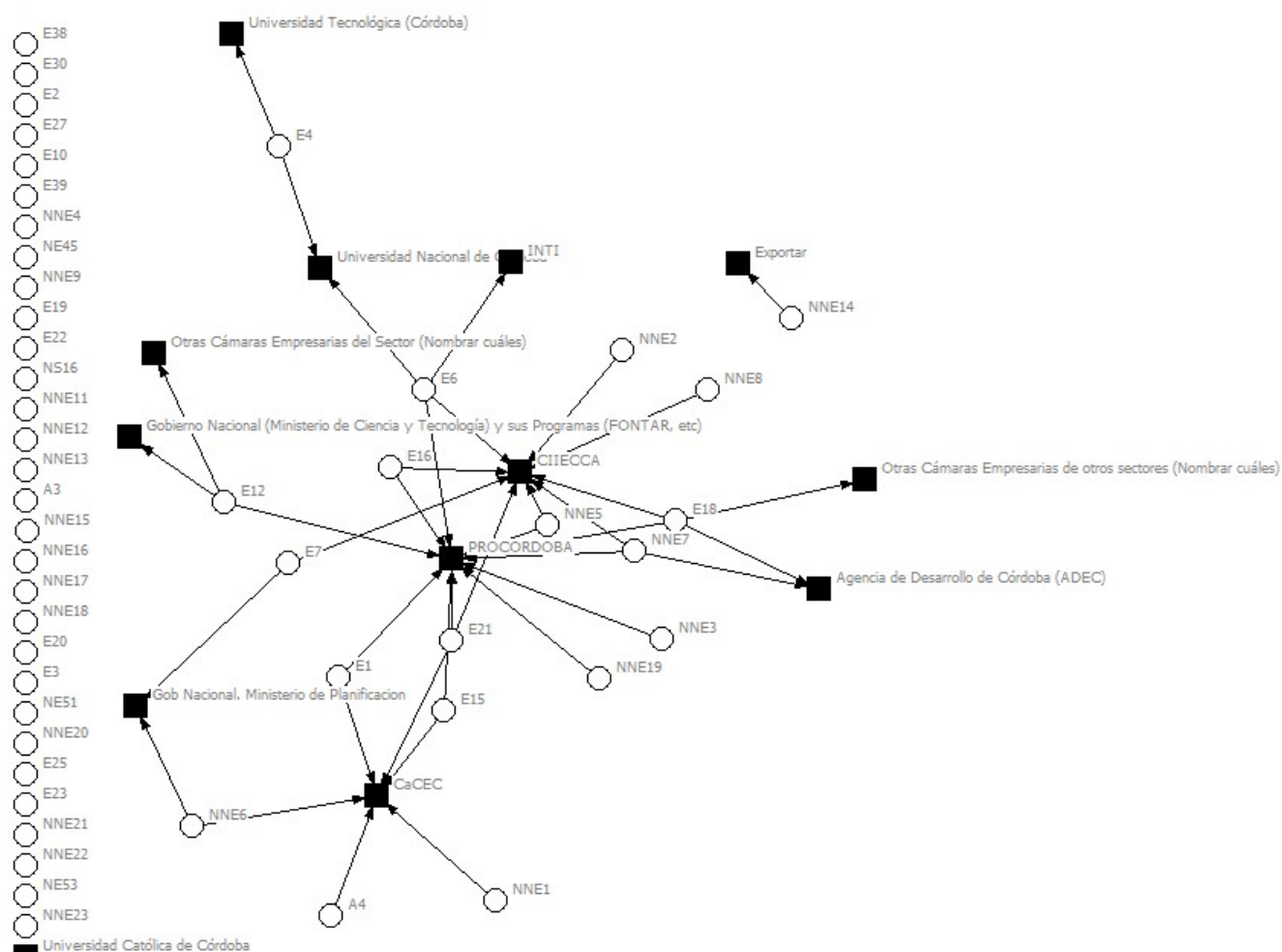
Technology-transfer Relationships with Local Institutions (2008-2011)

Technology-transfer linkages to Public/Private Local Institutions



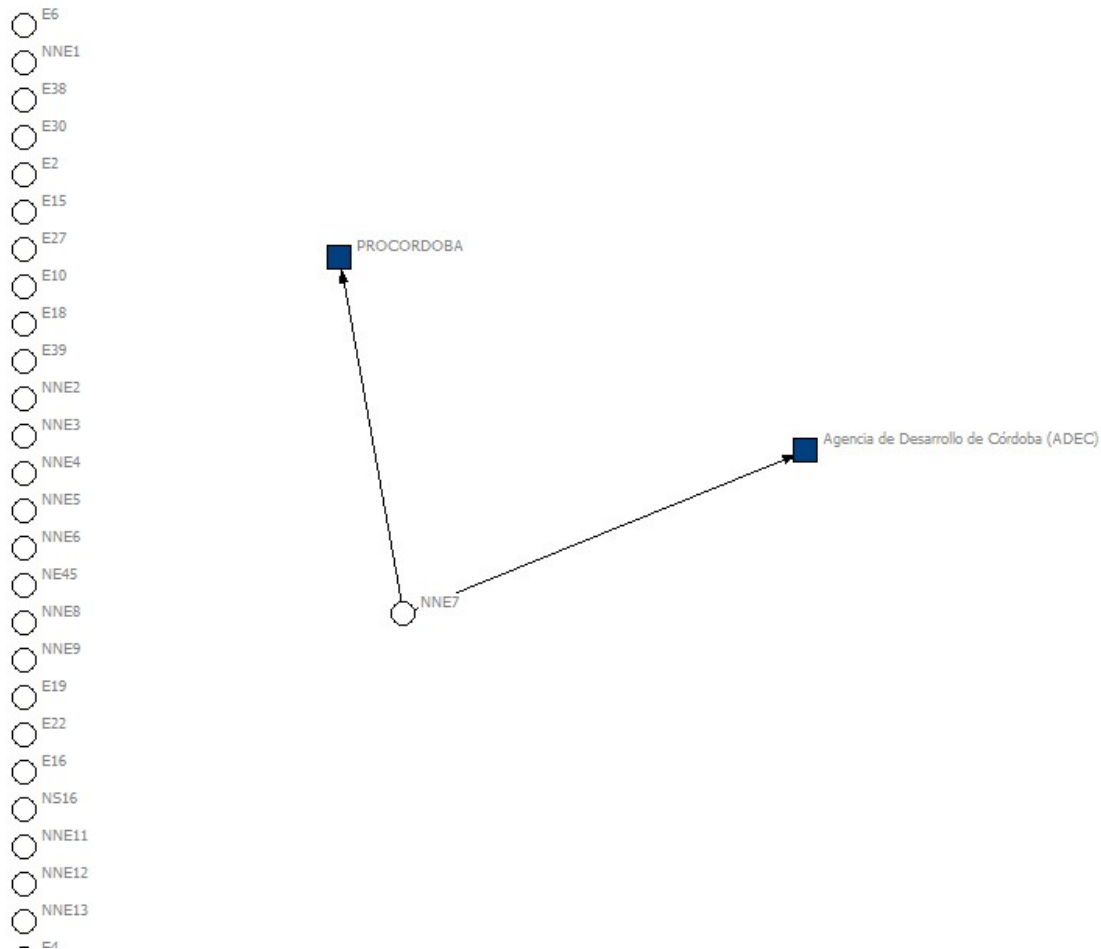
Technology-transfer Relationships with Local Institutions originated via the CDP (2008-2011)

Export-oriented linkages to Public/Private Local Institutions



Export-oriented Relationships with Local Institutions (2008-2011)

Export-oriented linkages to Public/Private Local Institutions



Export-oriented Relationships with Local Institutions via the CDP (2008-2011)

Other results

- Focus group insights:
 - CDP has “saved” some firms from failure
 - *Centro de Servicios Tecnológicos y de Manufactura con Tecnología de Montaje Superficial* (CSMT) fundamental to increase efficiency (big success), not necessarily in the hard data
- Qualitative answers:
 - General satisfaction towards the program, but mainly for generating trust and connections, untreated gauge positive experience from treated and willing to participate in the future

Recommendations for future CDPs

- Focus on projects with concrete objectives rather than on networking *per se* or pure match-making
- Bottom-up and flexible approach
- Avoid over ambitious targets
- Government engagement
- Need to agree on a code of ethics
- Observatory

Recommendations on future CDP using SNA

- Think 'dynamically': collect data over time (baseline)
- Agree with treated firms that they will be interviewed (at least) prior and after the CDP
- Think carefully about what is to be evaluated: what is to be expected from the CDP in terms of coordination and network structures?
- Contact the population of firms whenever possible
- In certain countries and industries online surveys may be an option
- SNA is easy and intuitive but consider having some training before starting
- For more sophisticated analyses, consider hiring an SNA expert for supporting your team
- Keep the dataset, as this can be used in the future

Useful References

- Giuliani E. & Pietrobelli C., 2011. **"Social Network Analysis Methodologies for the Evaluation of Cluster Development Programs,"** IDB Publications 53978, Inter-American Development Bank.
- Giuliani E. & Matta A., 2013. **"Impact Evaluation with Social Network Analysis Methods. Program for Supply Chain Development in the Province of Cordoba, Argentina"** Prepared for the Multilateral Investment Fund, Inter-American Development Bank.
- Giuliani E. , Maffioli A., Pacheco M., Pietrobelli C. & Stucchi R., 2013. **"Evaluating the Impact of Cluster Development Programs"**, Inter-American Development Bank. (forthcoming)

Thank You

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