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# The transition towards a bio-based economy: a social network analysis

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## Research Objectives:

The influence of different policy strategies on the emergency of a bio-plastics niche

Comparative assessment of bioplastics niches in Italy and Germany

## Theoretical Approach

Multi-level Perspective

Strategic Niche Management framework

Policy Strategy Framework

## Empirical Strategy

### Stakeholder analysis

- identify relevant actors involved in the Italian and German bioplastics industries

### Two focus groups (Government, Research, Industry, Trade Organizations)

- identification of five most relevant firms for each country
- development of a questionnaire

### Survey

- Introductory Section: General data
- Section I: Expectations, Challenges, Innovation
- Section II: Networking and Powerful actors

## Methodology

Survey administered online through Qualtrics

Roster-recall method for a final list of 30 Italian and 24 German firms

Social Network Analysis: UCINET 6 (Borgatti et al., 2002)

To control for the presence of:

- informal knowledge exchange
- formal technology transfer
- labour/researchers exchange

Among firms and between firms and other external actors

Indicators:

- density
- inclusiveness
- clustering coefficient
- network centralisation

## Results (I)

Introductory section: General data

German bioplastics industry:

- mostly composed of large firms
- mostly specialized in intermediate bio-based materials and compounds production

Italian bioplastics industry:

- characterized by SMEs
- mostly specialized in the production and/or commercialization of bio-based shoppers and bioplastics cutlery

## Results (II)

### Section I: Expectations

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Bioplastics will gradually replace traditional plastics		3 G	3I 2G	6 I 8 G	3 I 2 G
Current technologies allow the production of bioplastics in an economically efficient way	1 G	6 G 3 I	2 G	6 G 8 I	1 G
Future technological development will allow the production of bioplastics in an economically efficient way by 2030		1G	3 G 2 I	10 G 6 I	2 G 3 I
The production of bioplastics is sustainable from an environmental point of view		2 G 1 I	4 G	7 G 6 I	3 G 4 I
The production of bioplastics will become more sustainable from an environmental point of view by 2030			4 G	9 G 5 I	3 G 6 I

In both countries, the majority of participants believe that in 5 or 10 years there will be an acceleration of the bioplastics demand

## Results (III)

### Section I: Main Challenges and Innovation activity

	Not Relevant	Somehow relevant	Relevant	More Relevant	Strongly Relevant
Lack of demand	2 I	4 G 3 I	3 G 2 I	4 G 2 I	1G 2 I
Lack of investment	1 G	3 G 3 I	5 G 4 I	6 G 1 I	2 G 1 I
Technological constraints		5 G 1 I	7 G 5 I	1 G 3 I	3 G 1 I
Lack of regulation	1 G	4 G	3 G 3 I	4 G 4 I	5 G 2 I
Lack of long-term supportive policies	1 G 1 I	1 G	2 G 4 I	8 G 4 I	4 G 2 I
Dominant market share held by competitors	1 G 1 I	3G 2 I	4 G 4 I	7 G 2 I	2 G 1 I
Strong competition on product quality, reputation or brand	1 G 1 I	3 G 1 I	7 G 2 I	4 G 4 I	2 G 2 I
Lack of qualified labor	6 G	4 G 3 I	5 G 2 I	2 G 3 I	1 I

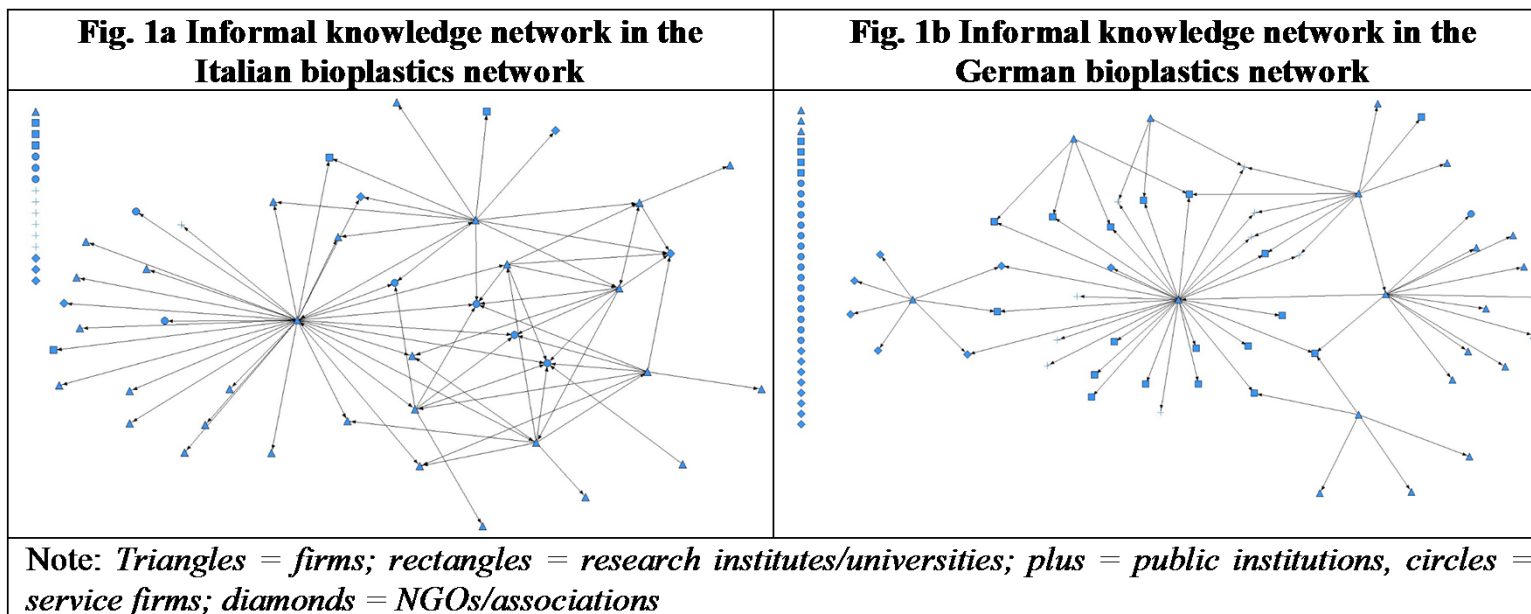
Very few firms has registered patents and/or trademarks (only the large ones)

Very few firms has been funded by public institutions for their innovation activity

Most of them fund their innovation activity with own funding

## Results (IV)

### Section II: Social Network Analysis

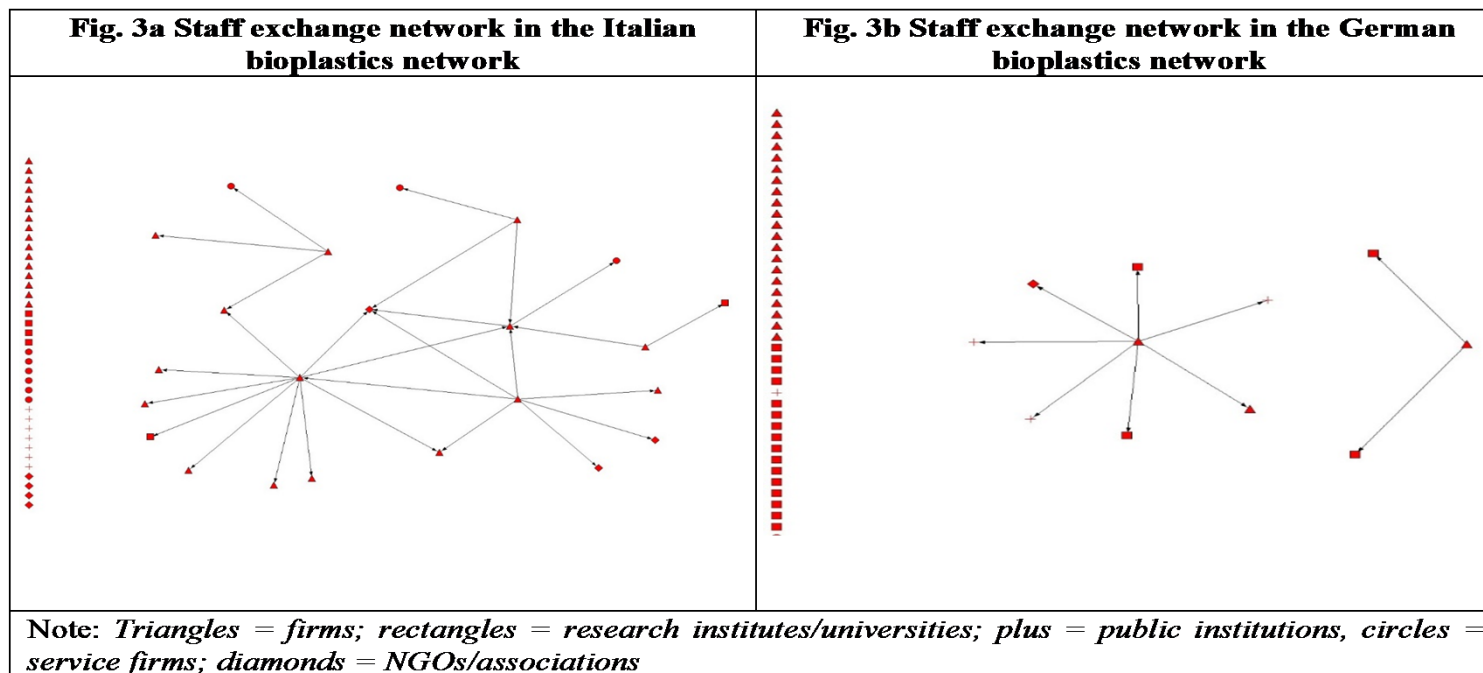


Network	Nr. Of ties	Density	Inclusiveness	Clustering coefficient (overall graph)	Network Centralisation
Informal knowledge (IT)	80	2.3 %	73.33%	0.401	51.13%
Informal Knowledge (Ge)	70	0.9%	64.4%	0.008	33.17%



# Results (V)

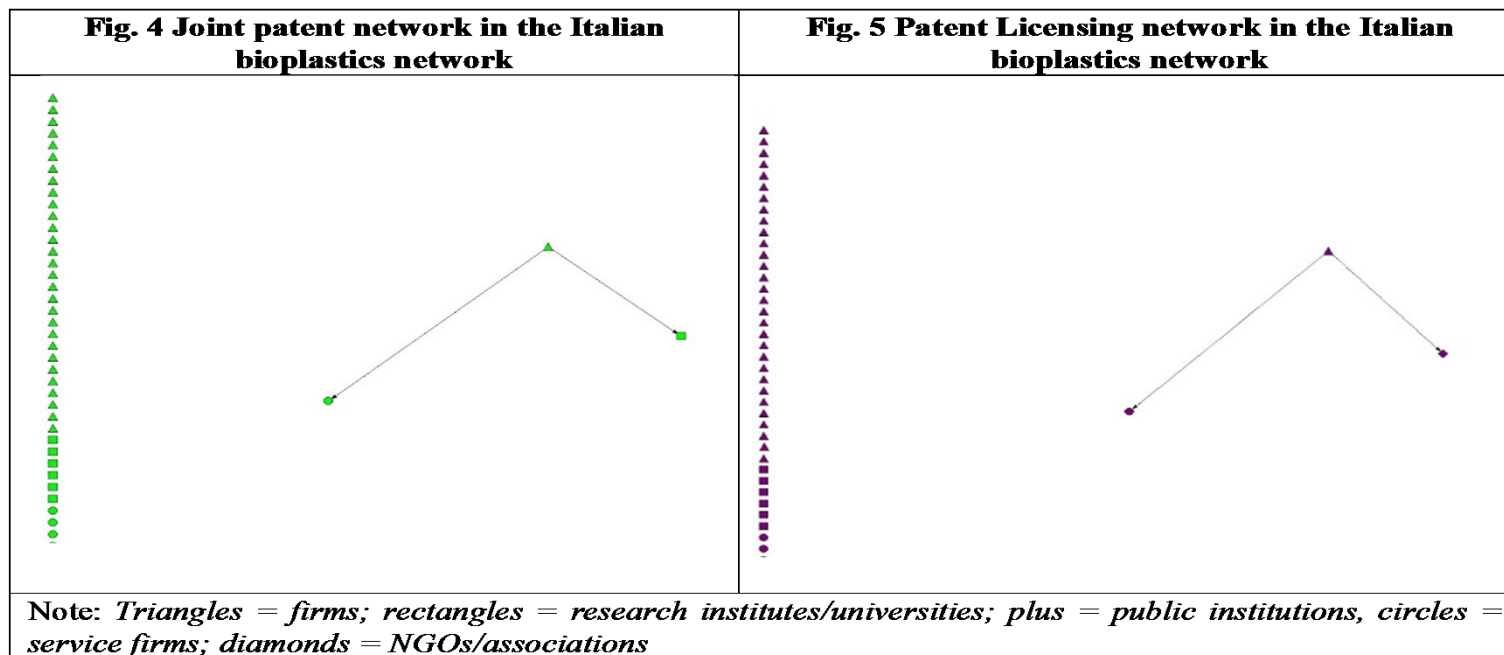
## Section II: Social Network Analysis



Network	Nr. Of ties	Density	Inclusiveness	Clustering coefficient (overall graph)	Network Centralisation
Labour exchange (IT)	27	0.8%	38.33%	0.141	16.46%
Labour exchange (Ge)	9	0.1%	12.6%	0	8.11%

# Results (VI)

## Section II: Social Network Analysis



Italian Network	Nr. Of ties	Density	Inclusiveness	Clustering coefficient (overall graph)	Network Centralisation
Joint Patent	2	0.1%	5%	0	3.39%
Patent Licensing	2	0.1%	5%	0	3.39%

## Conclusions

Firms in both niches share high level of expectations on the future development of the bioplastics industry

In both countries there are still a lot of challenges undermining the bioplastics niche development

The Italian network of informal knowledge share is more dense and centralized, instead the German network is more heterogeneous

The two different policies implemented by Italy promoting the demand-side and by Germany fostering the supply-side has generated two different types of niche that must learn from each other's experiences:

The Italian bioplastics niche needs to be more inclusive with respect to institutions, research centres and NGOs

The German bioplastics niche needs more formal and structured exchange of knowledge, intensifying staff exchange, patent licensing and joint patent development