

The anchors of territorial integration in Danish-German border region Cross-Border Institutional Thickness Model (CBIT)

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Introduction

EU Cohesion Policy → territorial integration → enhanced cross-border (CB) interactions.

- Creation of supportive systems of institutions:
 - Facilitators of cross-border interaction (EuroRegions)
 - Policy incentives in monetary terms (Interreg)
 - Active/passive participants (i.e. institutions, engaged in the CB interaction)
 - Formal/informal knowledge exchange

However...

lack of understanding how is the cross-border interaction developing in the European CB regions

Why?

Missing some techniques of how to study the cross-border institutional interaction

How can we measure cross-border institutional interaction?

The aim of this paper is to develop **empirical techniques** to study cross-border institutional interaction

Content:

- Develop a model to measure CB institutional interaction;
- Empirical experiment on case-study: **CB Region Sønderjylland-Schleswig (DK-GE)**
- Replicatory experiment on case-study: **EUREGIO Rhine-Waal (NL-GE)**

Theoretical framework for the model

- ‘INSTITUTIONAL THICKNESS’ (Amin and Thrift, 1995):
- Defined as the local conditions (non-economic factors) that are favourable for the local economic growth and development:
 - - In the case of CB regions, ‘institutional thickness’ can be elaborated in the cross-border cooperation and interactions that support European region integration....

4 Components:

1. A strong local institutional presence
2. The interaction between the institutions: formal and informal exchange
3. A common agenda or strategy towards achieving the development goal
4. Distribution of power and coordination

‘Institutional thickness’- a highly debated approach

• Advantages

- Inst. Thickness - evolved based on debates on institutional turn for last 2 decades
- Inst. Thickness- fits well with regionalism and ”hollowing out” of nation state arguments
- Inst. Thickness – studies not only Institutions, but its horizontal, vertical, formal and informal interactions

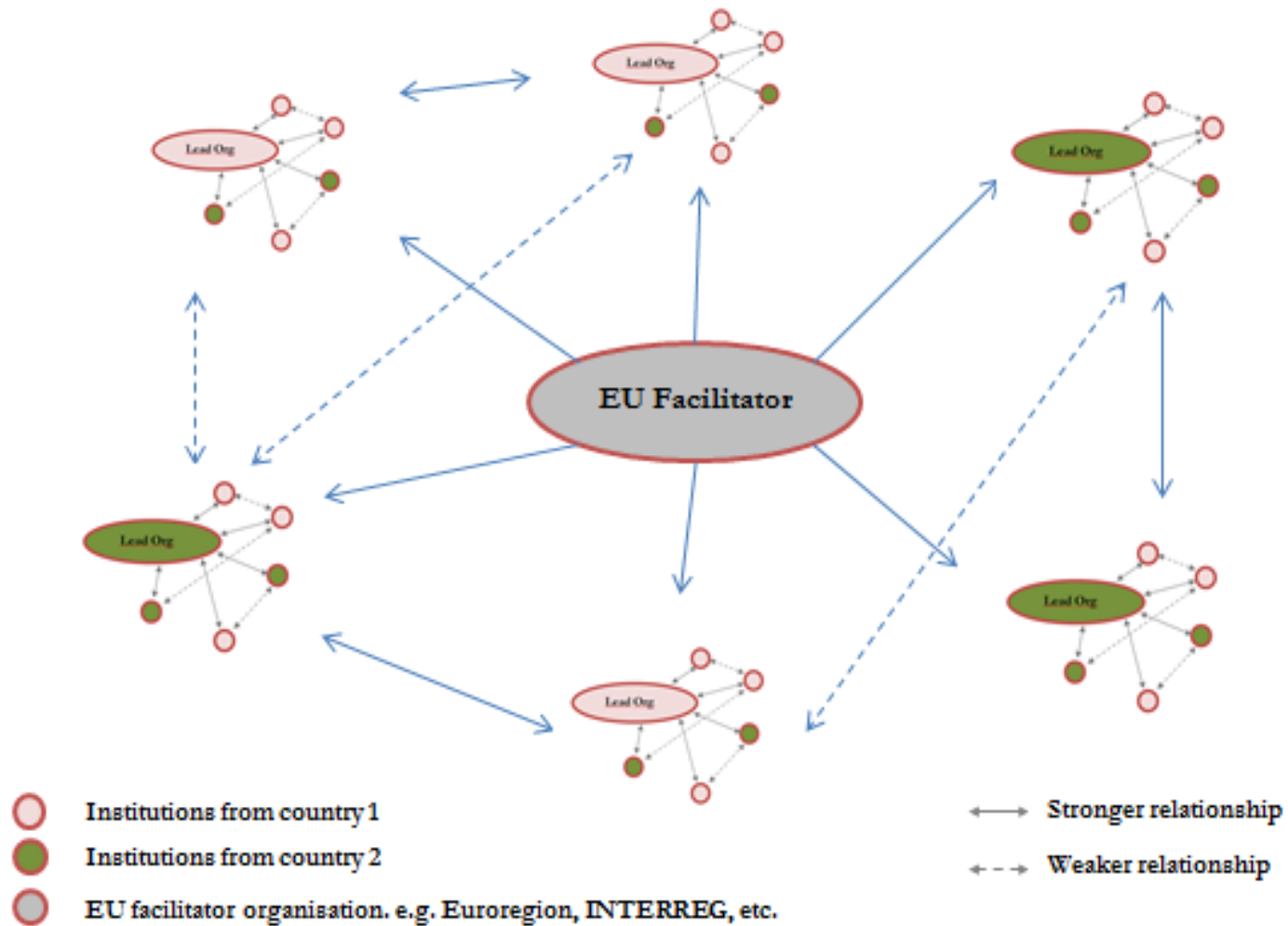
(e.g. Amin, Thrift, Martin, MacLeod, Goodwin, Raco, Jones, Jessop, Coulson, Ferrario, ect)

• Weaknesses

- Difficult to measure its role on local development
- Geographical proximity assumption (not all networks are place bounded)
- Produces easy fix policy guidelines, which might not be transferrable
- Difficult to theorise - as it is vague and ‘soft’

(e.g. Wood, Valler, Coulson, Ferrario, Healey, Gonzalez, MacLeod)

CBIT Structure



CBIT Empirical Model

CBIT components	SNA empirical method	Expected analyses
1. A strong local institutional presence	• Network cohesion; • Core-periphery structure; • Closeness centrality;	✓ The structure of the full network. ✓ Its cohesiveness, embeddedness and efficiency.
2. Interaction between the institutions – direct and indirect	• Degree centrality; • Eigenvector centrality;	✓ The maximum direct interactions of any institution, i.e. immediate influence. ✓ The maximum indirect interactions of any institution; i.e. long-term influence.
3. A common agenda or strategy towards achieving the development goal	• Identification of the common goal of interest (e.g. innovation); • Degree and Eigenvector centrality;	✓ The institutions that have maximum direct and indirect interactions in the network and participate in the projects that meet the common goal of interest (e.g. innovation).
4. Structures of domination, patterns of coalition and coordination regarding the financial matters	• Identification of the lead partners in the networks; • β-centrality;	✓ The lead partner organisations role/power/and centrality in the CBIT.

Data and collection method

- **Primary Data:** cross-border inter-organizational interaction on the common projects financed by **INTERREG** (between 2007-2015)
 - : *Strength* – Full population data (135 institutions in the case region) covers projects over the 7 years
 - : *Limitations* – selection-bias: monetary incentives for cross-border interaction might bias the natural need for cross-border interaction, however, such “fake” interactions might be few.
 - requires non-random sampling

CB Institutional Thickness in Sønderjylland-Schleswig



1970's – various
attempts of cross-
border cooperation
1997 – first official
cross-border
institution established

Region covers the
area of about
700 000 inhabitants:
- 450 000 German
side
- 250 000
Danish side

**INTERREG
program covers:**
whole Region of
Southern Denmark
and Land Schleswig-
Holstein in Germany



CBIT in Sønderjylland-Schleswig

1) A strong local institutional presence

1. A strong local institutional presence	To explore the structure of the CB institutional interaction	Network cohesion-embeddedness, Transitivity, Clustering coefficient and Core-periphery structure
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Country	Institutions	Lead partners	Involvement project
DK	66	44	142
GE	69	29	164
Grand Total	135	73	306

CB institutional thickness - Sønderjylland-Schleswig

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	coop_matr	ix

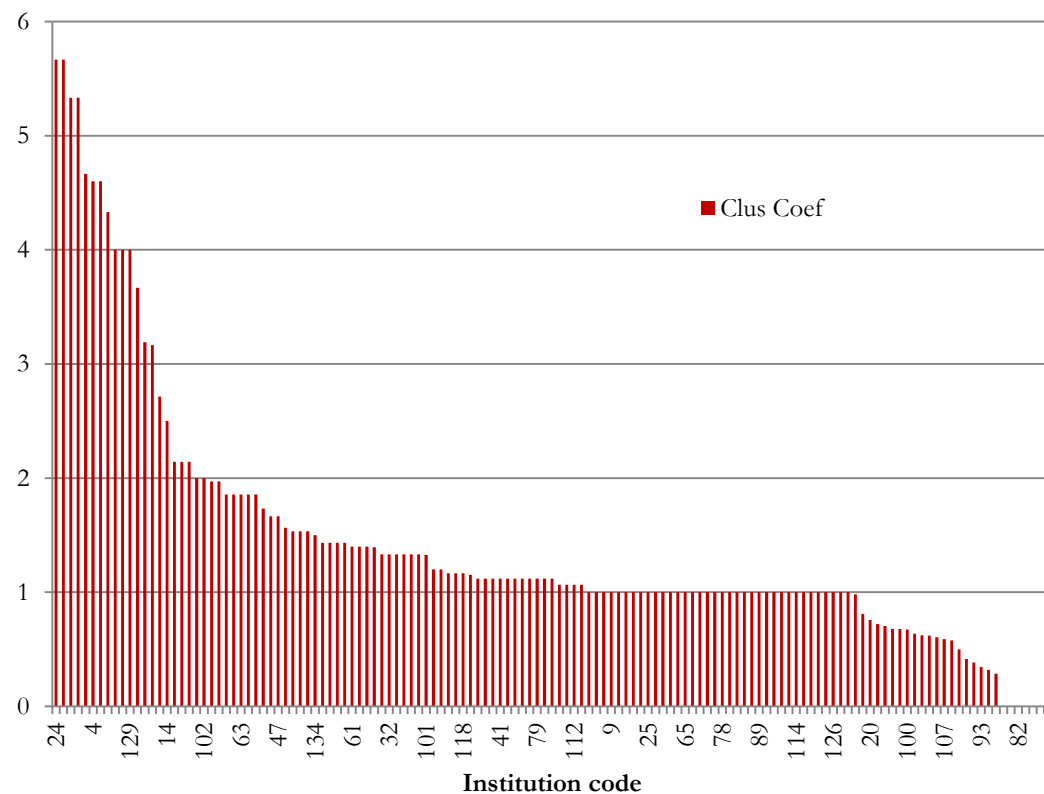
1	Avg Degree	7,748
2	Indeg H-Index	15
3	Deg Centralization	0,275
4	Out-Central	0,273
5	In-Central	0,273
6	Density	0,058
7	Components	8
8	Component Ratio	0,052
9	Connectedness	0,703
10	Fragmentation	0,297
11	Closure	0,526
12	Avg Distance	2,731
13	SD Distance	0,921
14	Diameter	5
15	Wiener Index	34724
16	Dependency Sum	22010
17	Breadth	0,701
18	Compactness	0,299
19	Mutuals	0,058
20	Asymmetrics	0
21	Nulls	0,942
22	Arc Reciprocity	1
23	Dyad Reciprocity	1

Network Transitivity

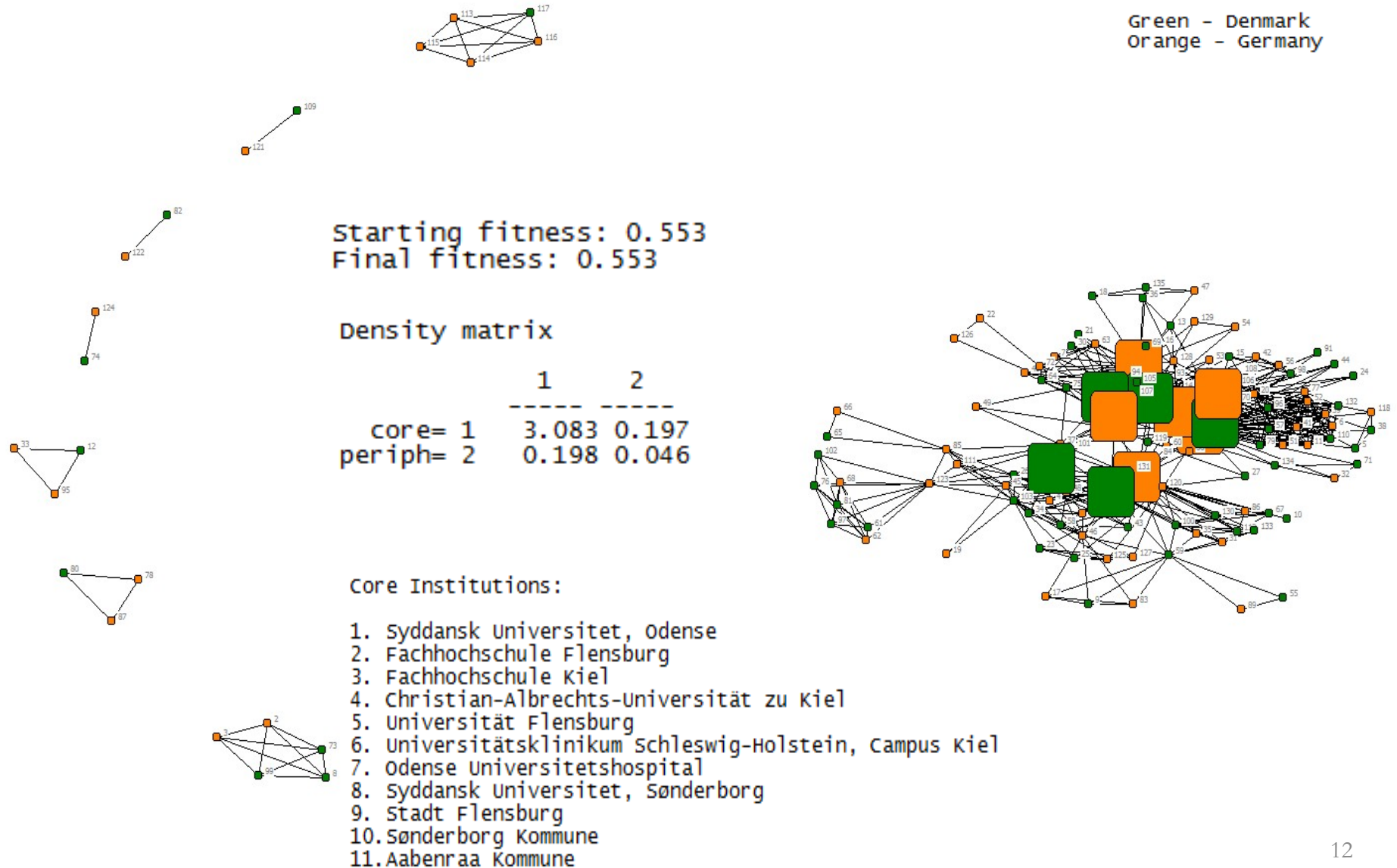
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1	Sheet1	26.994

Clustering Coefficient
Overall clus.coef. (OCC)
= 1,531
weighted overall
clus.coef (WOCC) = 0,797



Case study 1: Core-periphery structure of full-net



CB Institutional Thickness in Sønderjylland-Schleswig

2) The interaction between the institutions – formal and informal

2. The interaction between the institutions	To measure how do the information /resources flow in the (full) network? Measure immediate or longer/term influence on the cross-border institutional network?	Network Centrality: - Freeman closeness (for the network) - Freeman degree - Bonacich eigenvector
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Models for measuring centrality:

1. Freeman Degree centrality (Freeman, 1978; Borgatti and Everett, 2006) - the number of edges adjacent to a node.

$$C_i^{DEG} = \sum_j a_{ij}$$

Where, $\sum_j a_{ij} = A1$, where 1 is a column vector of ones, so $C_i^{DEG} = A1$. Every edge here is a walk length that equals to 1.

2. Bonacich Eigenvector centrality “Eigenvector centrality is defined as the eigenvector of A with the largest eigenvalue” (Bonacich, 2005; Borgatti and Everett, 2006, p.479)

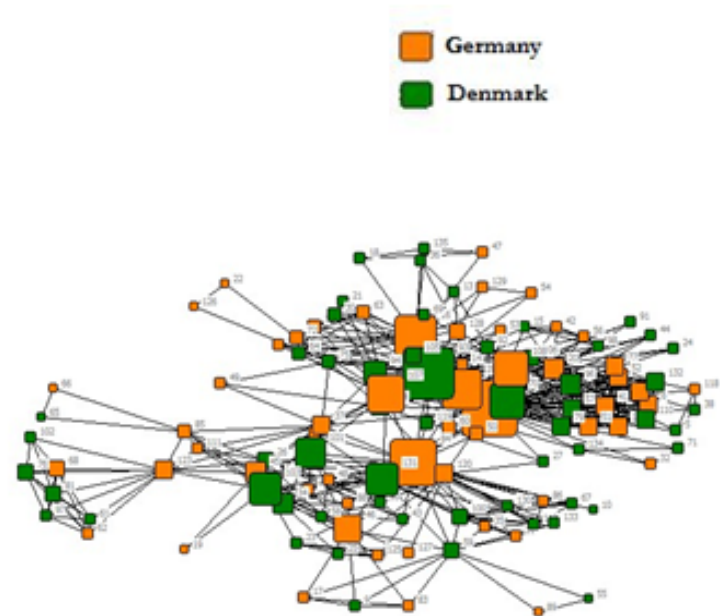
$$1) Ax = \lambda x, \quad 2) \quad \lambda x_i = \sum_{j=1}^n a_{ij} x_j \quad i = 1, \dots, n$$

x is the eigenvector centrality and λ is the maximum eigenvalue of A matrix. In the eq. 2) the centrality of a node is described in the sum of centralities of all those nodes that a node i is connected to, where n is the number of nodes in the network.

2) Direct and immediate interaction

Freeman degree centrality:

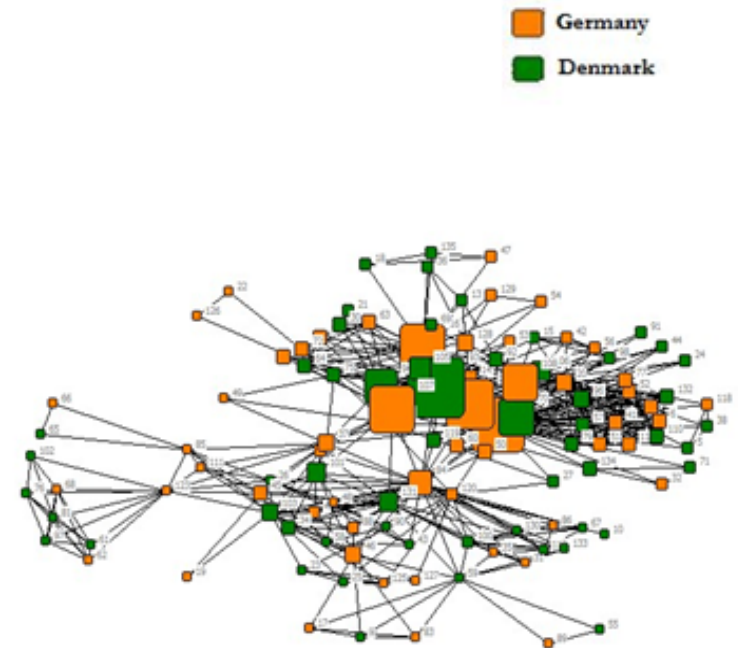
Institution's name	code	nDeg
Fachhochschule Flensburg	28	0,54
Syddansk Universitet, Odense	93	0,49
Stadt Flensburg	84	0,44
Christian-Albrechts-Universität zu Kiel	16	0,38
Fachhochschule Kiel	29	0,36
Universität Flensburg	107	0,34
Odense Universitetshospital	70	0,31
Universitätsklinikum Schleswig-Holstein, Campus Kiel	108	0,30
Aabenraa Kommune	131	0,28
Tønder Kommune	103	0,27
Sønderborg Kommune	101	0,25
Kreis Schleswig-Flensburg	46	0,22



2) Indirect and long term interaction

Bonacich Eigenvector centrality:

Institution name	code	Eigenvector
Syddansk Universitet, Odense	93	0,44
Fachhochschule Flensburg	28	0,39
Fachhochschule Kiel	29	0,35
Christian-Albrechts-Universität zu Kiel	16	0,33
Universität Flensburg	107	0,32
Universitätsklinikum Schleswig-Holstein, Campus Kiel	108	0,24
Odense Universitetshospital	70	0,24
Syddansk Universitet, Sønderborg	94	0,21
Stadt Flensburg	84	0,14
University College Lillebælt	105	0,11
Sønderborg Kommune	101	0,10
Aabenraa Kommune	131	0,10
Udviklingsråd Sønderjylland (URS)	104	0,09
University College Syd	106	0,08
Diakonissenanstalt Flensburg	20	0,08
Sydvestjysk Sygehus	96	0,07
Kreis Schleswig-Flensburg	46	0,07
Tønder Kommune	103	0,07
Industrie- und Handelskammer Flensburg	37	0,06
Wissenschaftszentrum Kiel GmbH	128	0,06



CB Institutional Thickness in Sønderjylland-Schleswig

3) A common agenda or strategy

Isolating the interaction where the projects aim to either **directly create the human capital** (education, labour market projects) or might **attract human capital** (knowledge intensive, innovation projects)

3. A common agenda or strategy towards achieving the development goal	Exploring the sub-networks created to achieve the common goals	As an example – sub-network supporting Human Capital creation in the region
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3) Human Capital supportive network

Institution name	nDeg	Eigenvector	core=1
Syddansk Universitet, Odense	0,49	0,44	1
Stadt Flensburg	0,44	0,14	1
Christian-Albrechts-Universität zu Kiel	0,38	0,33	1
Universitätsklinikum Schleswig-Holstein, Campus Kiel	0,30	0,24	1
Aabenraa Kommune	0,28	0,10	1
Tønder Kommune	0,27	0,07	0
Kreis Nordfriesland	0,14	0,04	0
Haderslev Kommune	0,13	0,05	0
Institut für Krebsepidemiologie	0,11	0,05	0
Landwirtschaftliche Krankenkasse Schleswig-Holstein und Hamburg	0,11	0,05	0
Schleswig-Holsteinische Krebsgesellschaft e.V.	0,11	0,05	0
Aabenraa Sygehus	0,11	0,05	0
Udviklingsråd Sønderjylland (URS)	0,10	0,09	0
Sønderborg Erhvervs- og Turistcenter (SET)	0,09	0,01	0
University College Lillebælt	0,08	0,11	0
Region Syddanmark	0,07	0,04	0
Syddansk Universitet, Kolding	0,06	0,05	0
Stadt Niebüll	0,06	0,01	0

CB Institutional Thickness in Sønderjylland-Schleswig

4) Power dominance - Structures of domination and patterns of coalition

4. Structures of domination and patterns of coalition	Lead partners' role in the cross-border interaction, as facilitators, and financial managers.	Lead partners vs. Bonacich Power
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- In full network:

Institution name	Normalized Beta Cent with beta=+0,031
Syddansk Universitet, Odense	5,07
Fachhochschule Flensburg	4,50
Fachhochschule Kiel	4,05
Christian-Albrechts-Universität zu Kiel	3,81
Universität Flensburg	3,70
Universitätsklinikum Schleswig- Holstein, Campus Kiel	2,79
Odense Universitetshospital	2,72
Syddansk Universitet, Sønderborg	2,44
Stadt Flensburg	1,79
Aabenraa Kommune	1,24
Sønderborg Kommune	1,24
University College Lillebælt	1,22
Udviklingsråd Sønderjylland (URS)	1,04

- In HCcoop:

Institution name	Normalized Beta Cent with beta=+0,031
Syddansk Universitet, Odense	5,07
Christian-Albrechts-Universität zu Kiel	3,81
Universitätsklinikum Schleswig- Holstein, Campus Kiel	2,79
Stadt Flensburg	1,79
Aabenraa Kommune	1,24
University College Lillebælt	1,22
Udviklingsråd Sønderjylland (URS)	1,04

CBIT in Case-Study: Sønderjylland-Schleswig

Institution name	nDeg	Eigen vector	core=1	HC- coop	Lead	nBeta beta=+0,031
Syddansk Universitet, Odense	0,49	0,44	1	1	1	5,07503
Fachhochschule Flensburg	0,54	0,39	1	0	1	4,50227
Fachhochschule Kiel	0,36	0,35	1	0	1	4,04769
Christian-Albrechts-Universität zu Kiel	0,38	0,33	1	1	1	3,81252
Universität Flensburg	0,34	0,32	1	0	1	3,69932
Universitätsklinikum Schleswig- Holstein, Campus Kiel	0,30	0,24	1	1	1	2,78921
Odense Universitetshospital	0,31	0,24	1	0	1	2,72485
Syddansk Universitet, Sønderborg	0,17	0,21	1	0	1	2,44021
Stadt Flensburg	0,44	0,14	1	1	1	1,79208
Aabenraa Kommune	0,28	0,10	1	1	1	1,24217
Sønderborg Kommune	0,25	0,10	1	0	1	1,24061
Udviklingsråd Sønderjylland (URS)	0,10	0,09	0	1	1	1,03761

Replicate to compare....Case: **EUROREGIO Rhine-Waal**

Institution name	core=1	nDeg	Eigenvect or	Hcco op	lead partner	nBeta $\beta=+0.022$
Landschaftsverband Rheinland, Köln	0	0,29	0,11	1	1	0,16
Volkshochschule der Stadt Duisburg	0	0,26	0,07	1	1	0,11
WFG für den Kreis Viersen	1	0,20	0,21	0	0	0,19
Gemeente Nijmegen	1	0,20	0,21	0	1	0,19
Gemeente Gennep	1	0,20	0,19	0	0	0,17
Gesellschaft für kommunales Marketing, Tourismus und Wirtschaftsförderung der Stadt Goch	1	0,18	0,18	0	0	0,16
Gemeente Bergen	1	0,17	0,18	0	1	0,16
Gemeinde Weeze	1	0,17	0,18	0	1	0,16
Gemeente Venray	1	0,17	0,16	0	0	0,15
Gemeente Groesbeek	1	0,16	0,18	0	1	0,16
Klasman-Deilmann GmbH, Geeste	1	0,15	0,17	0	0	0,15
Kreis Kleve	1	0,15	0,16	0	1	0,15

To sum up:

Developed CBIT model...

Model experimented on DK-GE case-study region

Model replicated on NL-GE case-study region

Model was used to compare and analyse different CBs

Summary tables of CBITs showed:

Rhine-Waal Region (NL-GE)

1.Key institutions → municipalities and local and regional administration.

2.Key formal/informal interaction → the key not even located in the CB region, and represent the national level interests.

3.Human Capital creation/attraction
→ **not one** of the main common agendas in the policy period 2007-2015.

4.Bonacich power is lower than beta-value itself. The network governance is flat and represents network administrative structure, where the EU regional facilitators (Euroregions, and Interreg joint secretariat) administer CB interactions.

Sønderjylland-Schleswig Region (DK-GE)

1.Key institutions → the universities and other HEIs, (shows more functional integration)

2.Key formal/informal interaction → universities and other HEIs. They use the financial opportunities from Interreg to issues at the regional and local level.

3.Human Capital creation/attraction → **one** of the main common agendas

4.Bonacich power is high in HEIs and correlate well with the institutions with high centrality values, as well as the lead partner institutions in the project.