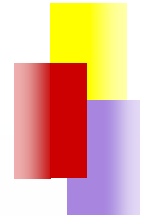**Prof. Dr. Arkadiusz Kowalski**
Head of East Asian Research Unit
World Economy Research Institute
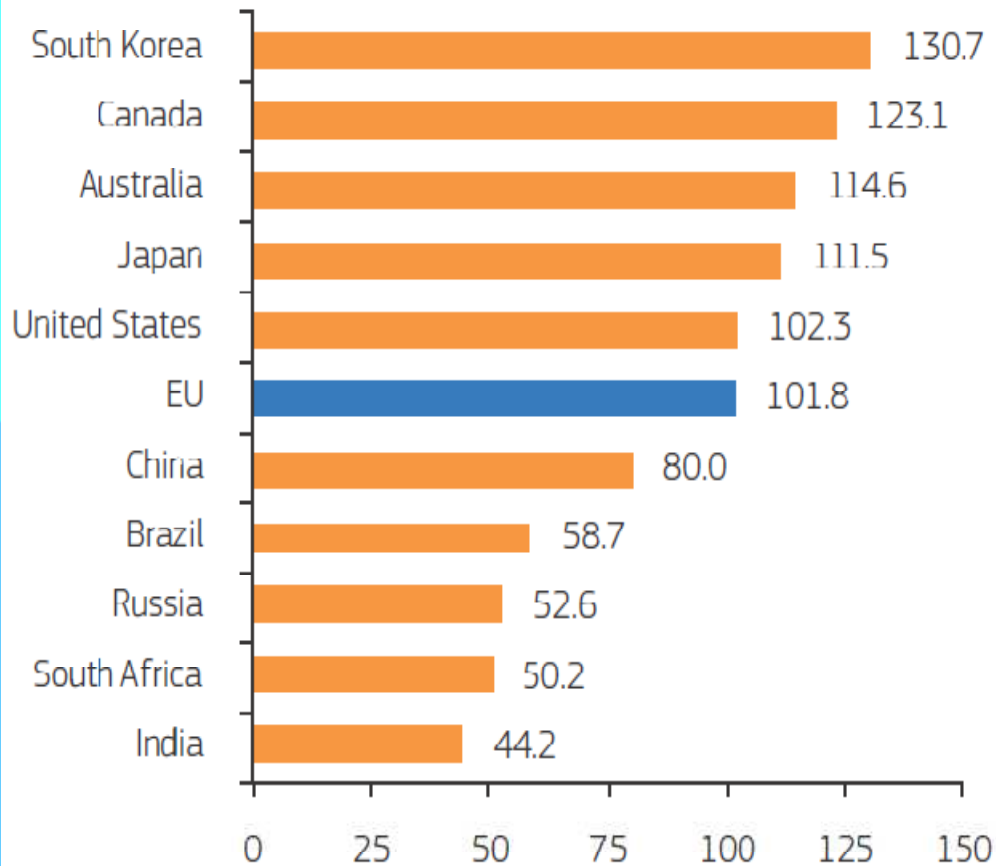**Warsaw School of Economics**

The role of clusters in determining
innovativeness of the economy –
theoretical foundations for empirical analysis
in China and Poland

E-LEADER conference, Warsaw, Poland, 2018

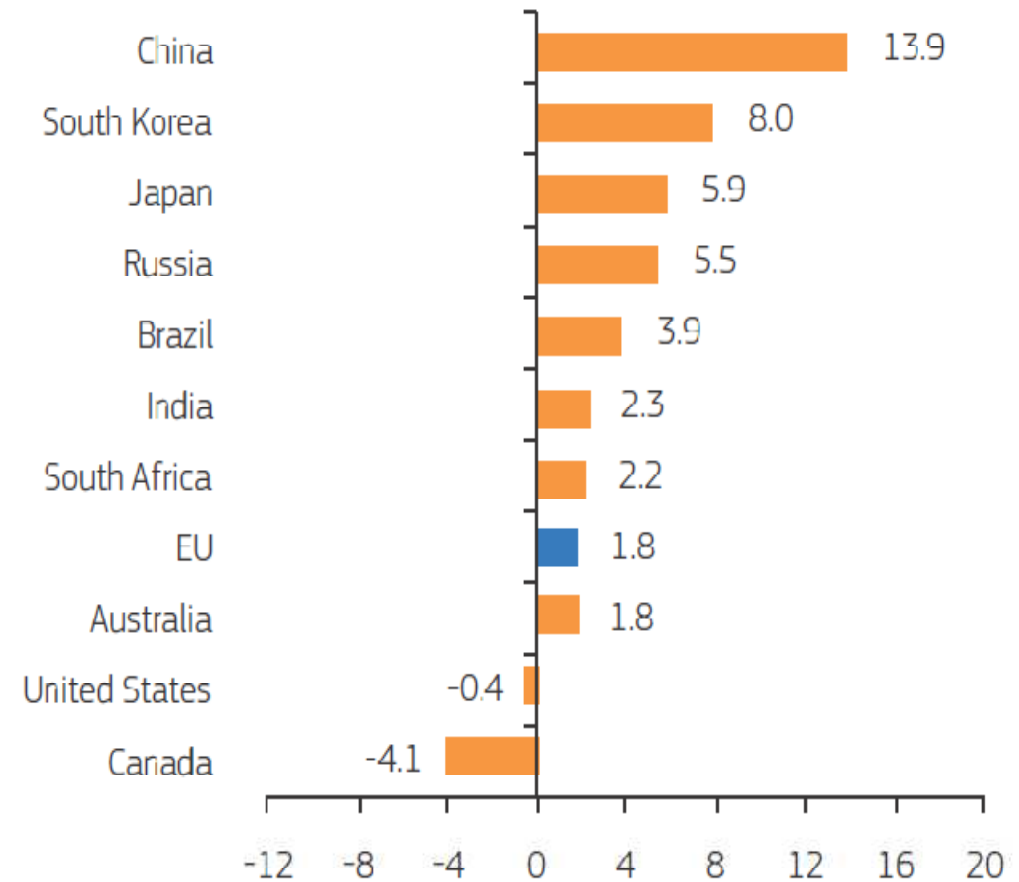# Benchmarking EU innovativeness against global competitors

Global performance

Country	Value
South Korea	130.7
Canada	123.1
Australia	114.6
Japan	111.5
United States	102.3
EU	101.8
China	80.0
Brazil	58.7
Russia	52.6
South Africa	50.2
India	44.2

Bars show countries' performance in 2016 relative to that of the EU in 2010.

Change in global performance

Country	Value
China	13.9
South Korea	8.0
Japan	5.9
Russia	5.5
Brazil	3.9
India	2.3
South Africa	2.2
EU	1.8
Australia	1.8
United States	-0.4
Canada	-4.1

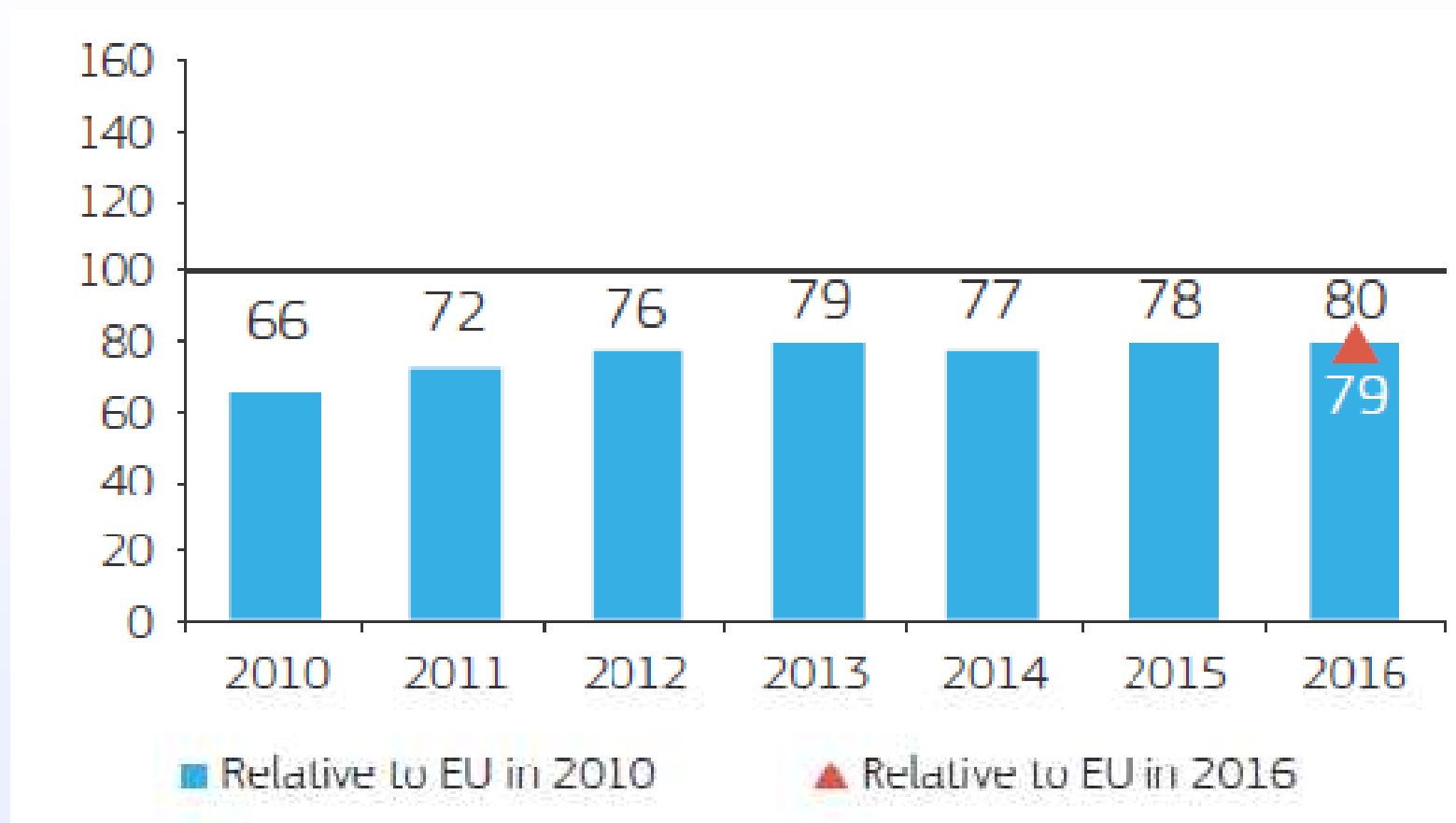*Change in performance is measured as the difference between the performance in 2016 relative to the EU in 2010 and the performance in 2010 relative to the EU in 2010.*

Source: European Innovation Scoreboard 2017

Innovation gap between China and the European Union

Source: European Innovation Scoreboard 2017

Clustarisation of knowledge-intensive activities

The more knowledge-intensive an activity is, the more geographically clustered (regionalized) it tends to be.

The trend towards spatial concentration of knowledge-intensive activities has become more marked over time.

"**Clusters** are geographic concentrations of interconnected companies, specialized suppliers and service providers, firms in related industries, and associated institutions (e.g. universities, standard agencies, and trade associations) in particular fields that compete but also cooperate. Such clusters are a striking feature of virtually every economy, especially those of more economically advanced areas." (M. Porter)
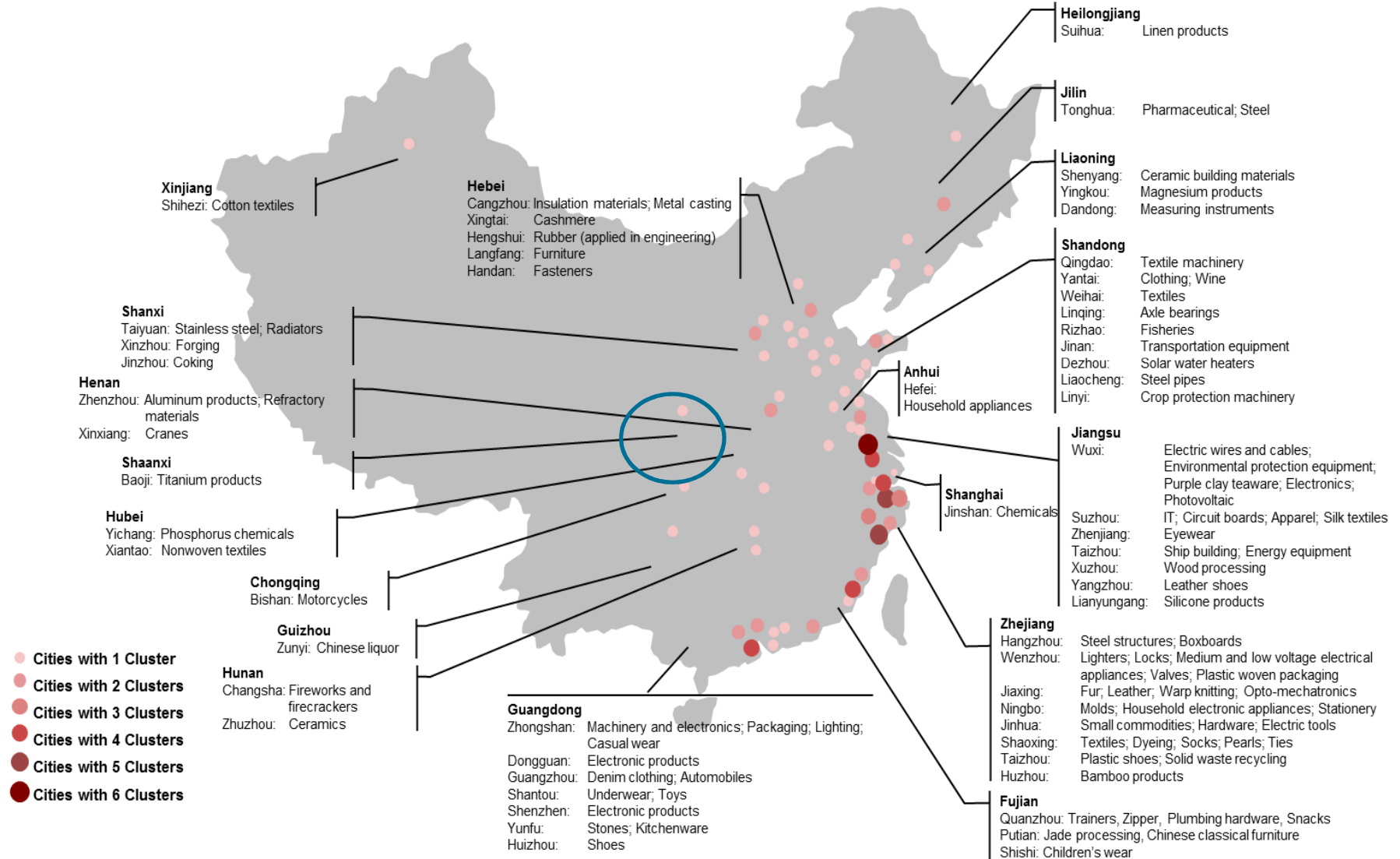
4

Criticism towards the cluster concept

➢ Cluster boundaries "rarely conform to standard industrial classification systems, which fail to capture many important actors in competition as well as linkages across industries" (Porter 1998, p.204)

➢ According to R. Martin and P. Sunley [„Deconstructing clusters: chaotic concept or policy panacea?", *Journal of Economic Geography*, 2003, 3(1), 5-35], **cluster definitions lack clear boundaries**, both **industrial** and **geographical**, and do not give answers to the following questions:

   o At what level of industrial aggregation should a cluster be defined?

   o What range of related or associated industries should be included?

   o How strong do the linkages between firms have to be?

   o How economically specialised does a local concentration of firms have to be to constitute a cluster?

   o At what spatial scale, and over what geographical range, do clustering processes operate?

   o What spatial density of such firms and their interactions defines a cluster?

Different types of clusters
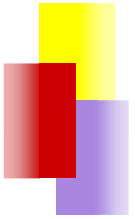
- **Geographic Extent**: local, regional, interregional, transborder…

- **Knowledge intensity:**
  - industrial clusters
  - clusters based on knowledge

- **Types of members:**
  - **Marshallian clusters (or Italian type)** are comprised primarily of locally owned SMEs.
  - **Hub and spoke clusters** are dominated by one or several large firms surrounded by smaller suppliers and related activities.
  - **State-anchored industry clusters** – local business structure is dominated by a public or non-profit entity (e.g. military base, university, government offices).

- **Cluster Life Cycle- Phasse:**

  Embryonic, Growing, Mature/Declining, Renewing

Clusters in China

Heilongjiang
Suihua: Linen products

Jilin
Tonghua: Pharmaceutical; Steel

Liaoning
Shenyang: Ceramic building materials
Yingkou: Magnesium products
Dandong: Measuring instruments

Shandong
Qingdao: Textile machinery
Yantai: Clothing; Wine
Weihai: Textiles
Linqing: Axle bearings
Rizhao: Fisheries
Jinan: Transportation equipment
Dezhou: Solar water heaters
Liaocheng: Steel pipes
Linyi: Crop protection machinery

Xinjiang
Shihezi: Cotton textiles

Hebei
Cangzhou: Insulation materials; Metal casting
Xingtai: Cashmere
Hengshui: Rubber (applied in engineering)
Langfang: Furniture
Handan: Fasteners

Shanxi
Taiyuan: Stainless steel; Radiators
Xinzhou: Forging
Jinzhou: Coking

Henan
Zhenzhou: Aluminum products; Refractory
            materials
Xinxiang: Cranes

Shaanxi
Baoji: Titanium products

Hubei
Yichang: Phosphorus chemicals
Xiantao: Nonwoven textiles

Chongqing
Bishan: Motorcycles

Guizhou
Zunyi: Chinese liquor

Hunan
Changsha: Fireworks and
            firecrackers
Zhuzhou: Ceramics

Anhui
Hefei:
Household appliances

Shanghai
Jinshan: Chemicals

Jiangsu
Wuxi: Electric wires and cables;
            Environmental protection equipment;
            Purple clay teaware; Electronics;
            Photovoltaic
Suzhou: IT; Circuit boards; Apparel; Silk textiles
Zhenjiang: Eyewear
Taizhou: Ship building; Energy equipment
Xuzhou: Wood processing
Yangzhou: Leather shoes
Lianyungang: Silicone products

Zhejiang
Hangzhou: Steel structures; Boxboards
Wenzhou: Lighters; Locks; Medium and low voltage electrical
            appliances; Valves; Plastic woven packaging
Jiaxing: Fur; Leather; Warp knitting; Opto-mechatronics
Ningbo: Molds; Household electronic appliances; Stationery
Jinhua: Small commodities; Hardware; Electric tools
Shaoxing: Textiles; Dyeing; Socks; Pearls; Ties
Taizhou: Plastic shoes; Solid waste recycling
Huzhou: Bamboo products

Fujian
Quanzhou: Trainers, Zipper, Plumbing hardware, Snacks
Putian: Jade processing, Chinese classical furniture
Shishi: Children's wear

Guangdong
Zhongshan: Machinery and electronics; Packaging; Lighting;
            Casual wear
Dongguan: Electronic products
Guangzhou: Denim clothing; Automobiles
Shantou: Underwear; Toys
Shenzhen: Electronic products
Yunfu: Stones; Kitchenware
Huizhou: Shoes

- ● Cities with 1 Cluster
- ● Cities with 2 Clusters
- ● Cities with 3 Clusters
- ● Cities with 4 Clusters
- ● Cities with 5 Clusters
- ● Cities with 6 Clusters

Source: Li & Fung Research Centre; The Beijing Axis Analysis

Interactive (!) map of clusters in Poland
http://www.pi.gov.pl/PARP/data/klastry/

klaster
inicjatywa klastrowa

Verifying geographical concentration of industries

## Location quotients

$$LQi=(xi/x)/(Xi/X)$$

where:

- LQi is the location quotient of industry i in the local region,

- xi is the value of an analysed indicator (for example employment) of industry i in a given region,

- x is the total value of an analysed indicator in a given region,

- Xi is a value of an analysed indicator in industry i in a reference area,

- X is a total value of an analysed indicator in a reference area.

Location quotients for employment in ICT-related NACE divisions for Polish LAU1 regions in the background of formal ICT cluster initiatives

LQ_emp < 1,25
1,25 ≤ LQ_emp < 2
LQ_emp ≥ 2
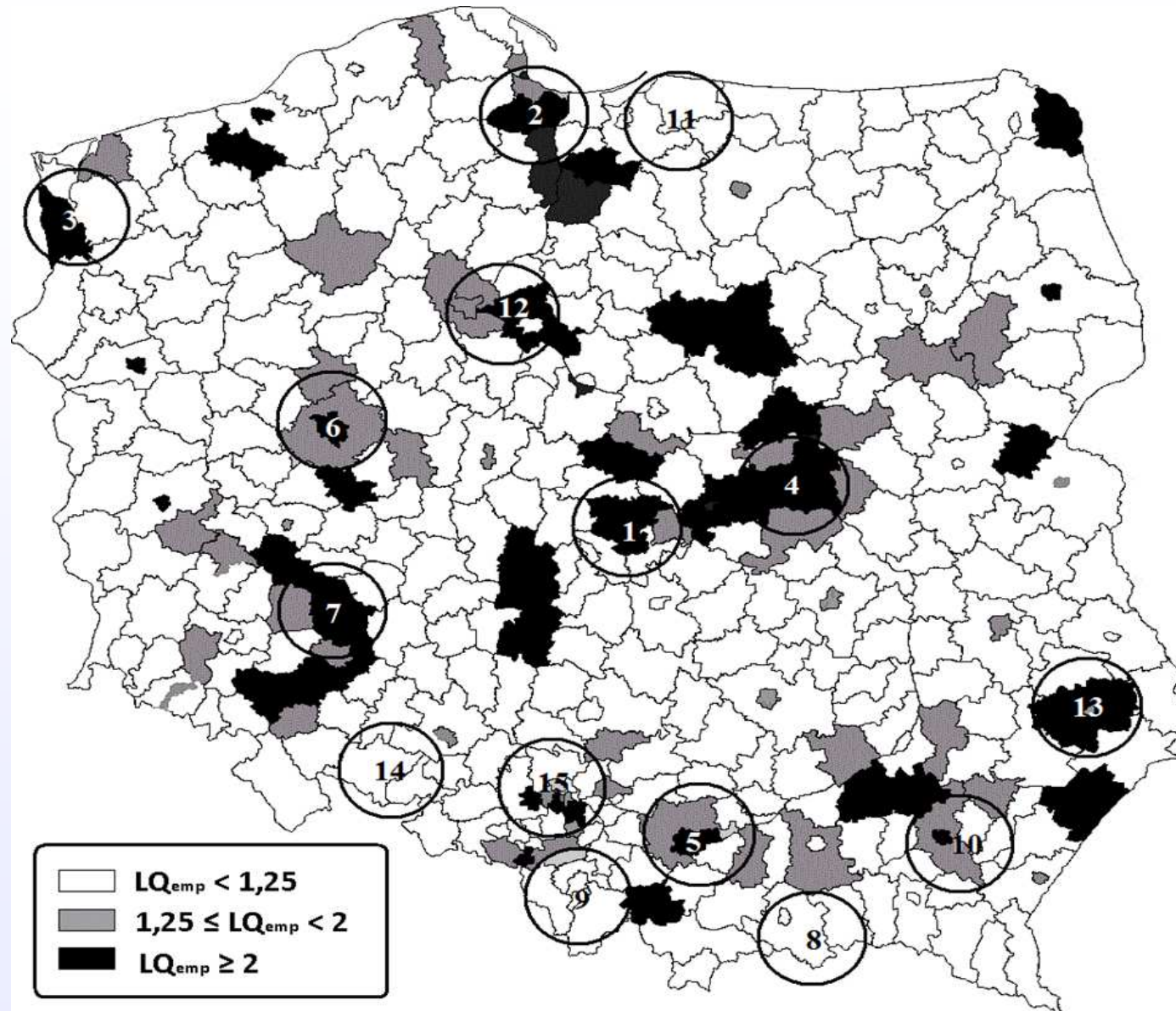
Source: A.M. Kowalski (2016), *Territorial location of ICT cluster initiatives and ICT-related sectors in Poland*, in: H. Drewello, M. Bouzar, M. Helfer (eds): *Clusters as a Driving Power of the European Economy*, Baden-Baden: Nomos, pp. 49-66.

Triple-helix: which types of actors are important for clusters?

Industry

Clusters

Public sector

Science
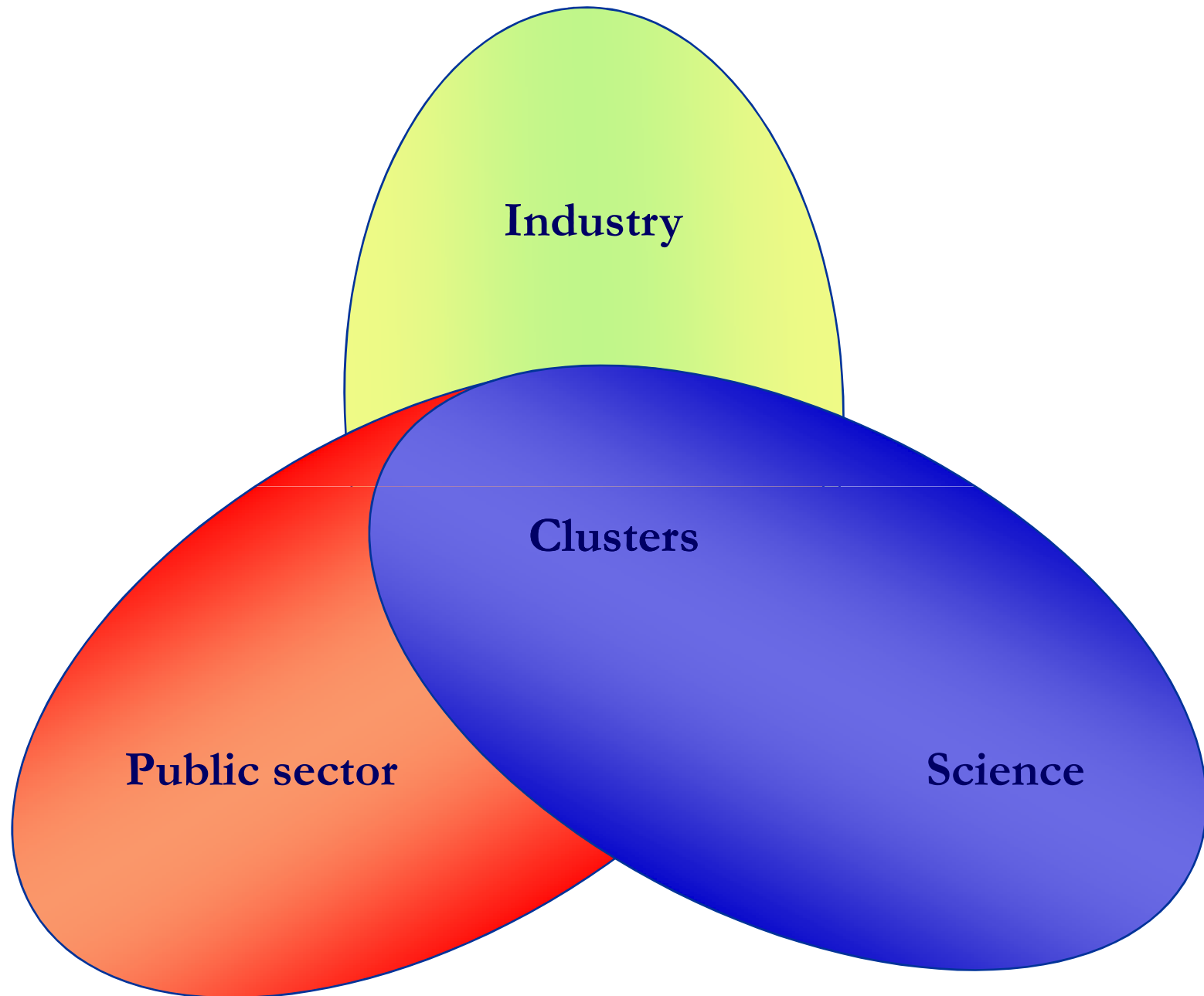
Innovation in clusters
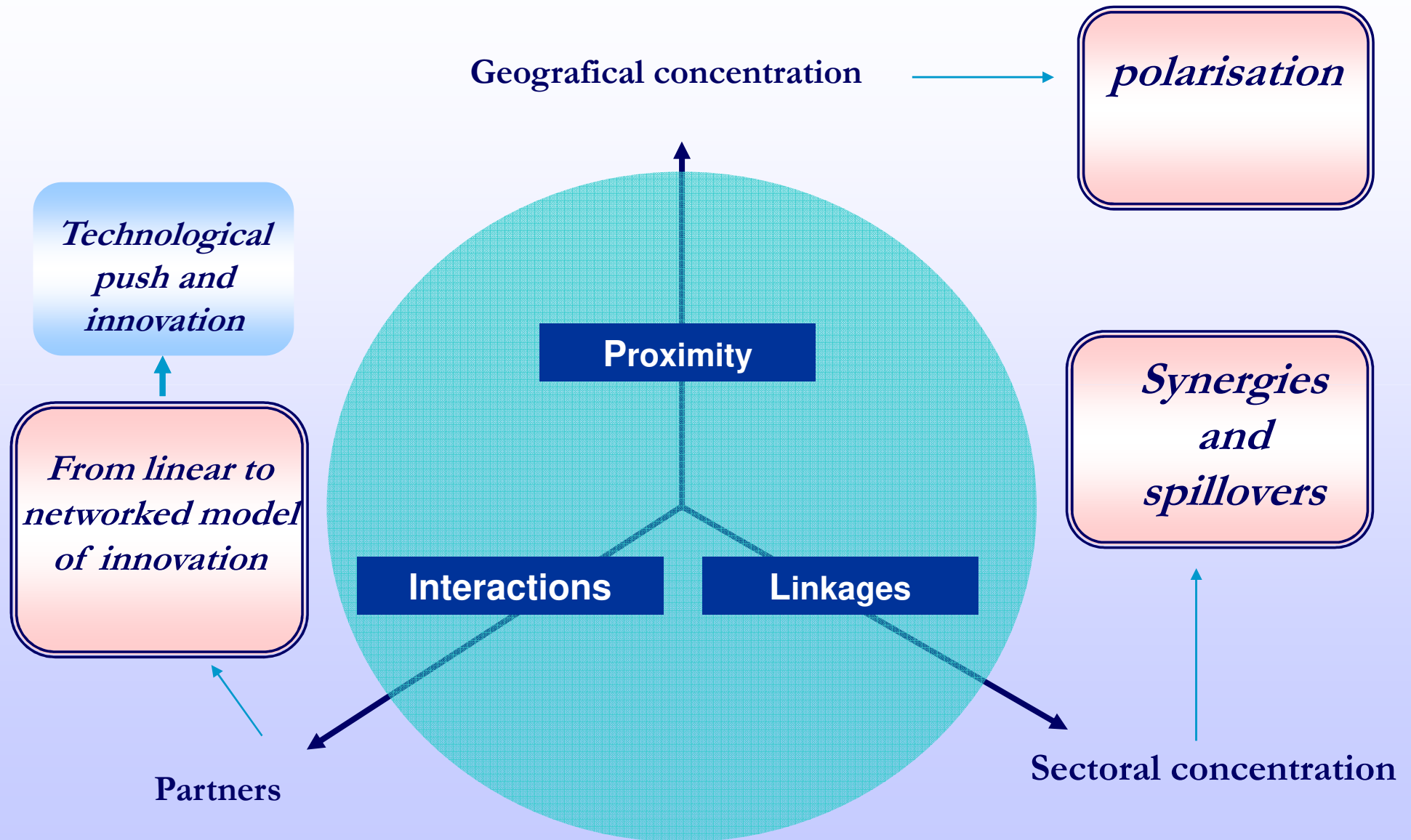
The verification of the role of clusters for the competitiveness and innovativeness

Methodology: survey research conducted in 2012, using 2 methods:

➢ CATI (Computer Assisted Telephone Interview)

➢ CAWI (Computer Assisted Web Interview)

Study sample size was 400 respondents, including:

➢ 50 coordinators of cluster initiatives operating in Poland

➢ 350 companies being the members of cluster initiatives

Activities aiming at increasing the level of innovativeness of economic units undertaken by clusters in Poland

Activities	% of the clusters
Facilitating access to **external sources of expert knowledge**	71
Cooperation with local **universities and schools**	57
Organization of **common events**: seminars, workshops and trainings for employees of cluster units	57
Professional services of **research and development units** for cluster members: preparing new technologies, research and testing new products, etc.	50
Establishing the institution **supporting technology transfer** among cluster actors (advise, preparing databases with cooperation offers, etc.)	43
Establishing the institution **supporting technology transfer** with external units, not belonging to cluster	36

Assessment of the impact of scientific units participation in clusters on technological advancement of the activity of the enterprises

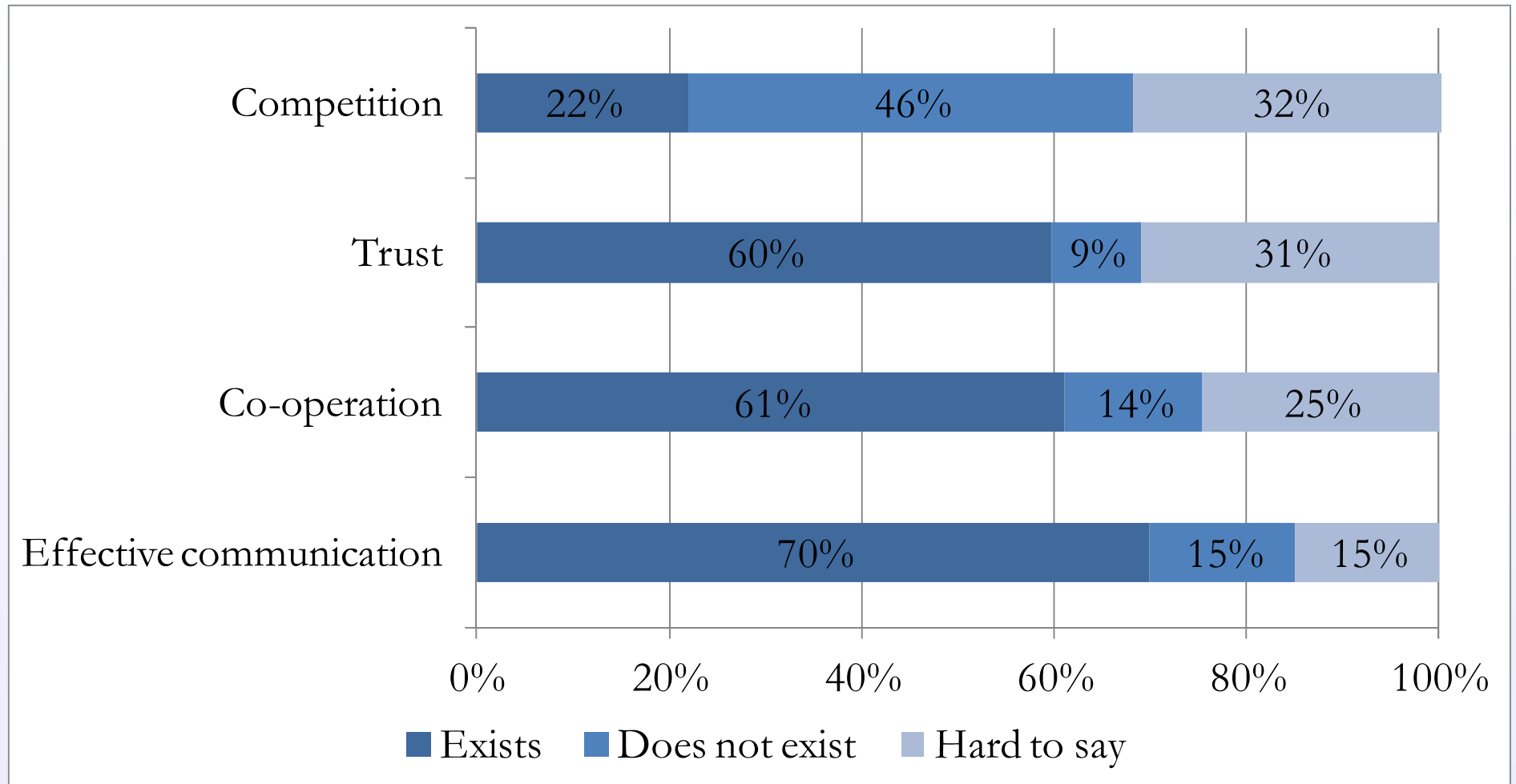| The impact of scientific units in cluster on the level of technological advancement of the activity of the enterprise	The share of the enterprises (%)
No impact	20
Small impact	19
Medium impact	33
Big impact	8
Hard to say	10
There are no scientific units in the cluster	10

60%

Types of innovations introduced by the company as a result of co-operation with other participants in the cluster initiative

Type of innovation	Number of companies	Percentage of companies
Product innovation	61	17.43%
Process innovation	42	12.00%
Marketing innovation	79	22.57%
Organisational innovation	60	17.14%
No innovation introduced as the consequence of being a cluster member	233	66.57%

# Degree of novelty of innovation introduced as a result of co-operation in clusters
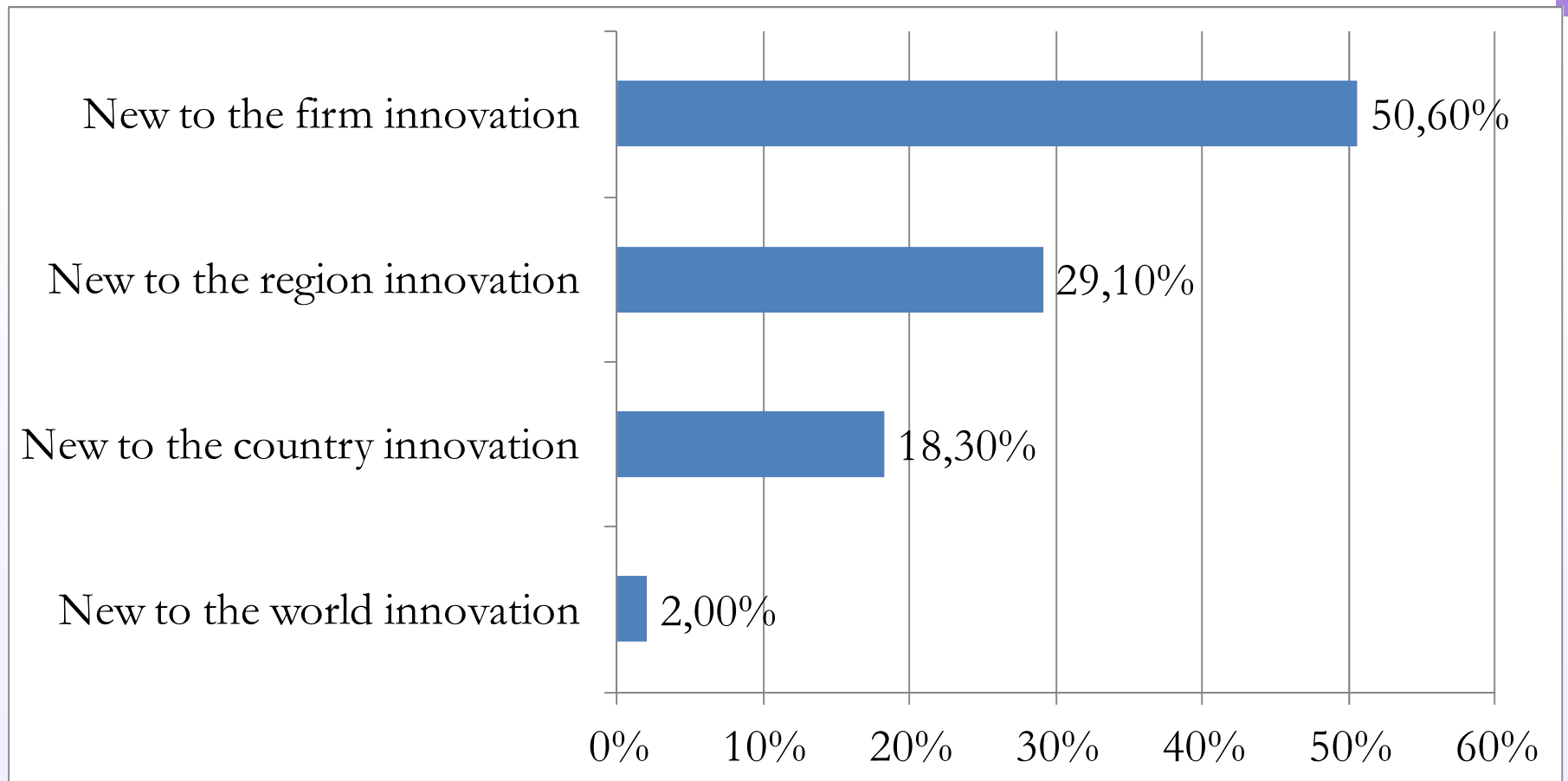
The characteristic aspects of the relationship with partners within Polish cluster [n=350]

Aspect	Exists	Does not exist	Hard to say
Competition	22%	46%	32%
Trust	60%	9%	31%
Co-operation	61%	14%	25%
Effective communication	70%	15%	15%

Success factors for cluster development

➤ Leading role of the industry

➤ Role of custumers *(case study – clusters and UDI)*

➤ Incorporating scientific units into clusters - strengthening the innovation basis

➤ Active public support: identify and address market failure

   ➤ Bottom-up approach

➤ Become part of an international cluster learning network
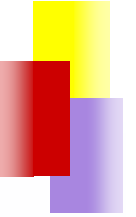
Thank you

arkadiusz.kowalski@sgh.waw.pl