

TOWARDS SEARCHING FOR A GAP IN NETWORK RELATIONS FOR SMART SPECIALIZATION STRATEGY – RESULTS OF BIBLIOMETRIC ANALYSIS

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Purpose: Over the recent years, the literature on the subject has given much attention to the issues of regional innovativeness. Within this broadly defined concept, the issues covered by research studies and analyses include: enterprises' capabilities to search for new concepts and inventions, cooperation among enterprises, cooperation between the public sphere and enterprises, cooperation between research institutions and enterprises. Effectiveness of those relations translates into the extent to which innovations are generated and absorbed in the regions. The purpose of this study is to identify the significance of regional partnerships in the currently implemented smart specialization strategies and to search for research gaps in the currently conducted studies in that area.

Design/methodology/approach: In order to attain this research goal, the study applied the systematic literature review (SLR) method, also making use of the text mining method and the VOSviewer (bibliometric mapping) tool.

Findings: The research study found that the approach to building network relations within partnerships for smart specialization strategy implementation is changing. Currently, network relations and partnerships are deeply rooted in the EU policies, such as those related to sustainable development, support for European Green Deal implementation, the EU industrial policy strategy, Horizon Europe programme, the Cohesion Policy.

Originality/value: The analyses completed as part of the study have unambiguously confirmed the direction of activity of network relations within smart specialization strategies, and at the same time have shown that this is a niche issue which is entering the stage of intensive development.

Keywords: network relations, regional partnerships, smart specialization strategy, innovativeness, SLR, scientific mapping.

Category of the paper: Research paper; Literature review.

1. Introduction

Partnership is predicated on a conviction that multi-faceted problems may be solved in a situation where various entities with shared needs complement and support each other via joint actions taken within competences that are as close as possible to their core activity. Active cooperation contributes to a synergy effect, where joint initiatives bring significantly bigger benefits compared to individually completed activities (Kogut-Jaworska, 2012, p. 137).

In the context of creating new innovativeness strategies, including smart specialization strategies, which represent the bottom-up approach to development management, the concept of regional partnerships for innovativeness was introduced, denoting broad coalitions of stakeholders from heterogeneous organizations such as regional authorities, companies, and universities, where joint interests constitute the basis for cooperation (Benneworth, 2007, p. 16; Nieth, 2019, p. 204; D et al., 2022). Within the framework of regional partnerships for innovativeness, stakeholders cooperate with each other, design and implement strategies, and as a result promote innovativeness and regional development.

Cooperation between such partners takes place in an atmosphere of sharing ideas about the way of resolving specific matters, identification with common goals, division of competences, means, and risks. Cooperation within the framework of regional partnerships for innovative development of regions is predicated on the two major premises:

- firstly, the impact on innovative development is limited for each entity in the regional economy, however, as part of integrated activity, i.e. cooperation, the impact capabilities are definitely bigger,
- secondly, dialogue, cooperation and partner relations between the entities make it possible to better recognize the needs of all the actors on the economic stage, which enables better adjustment of the range of instruments of impact and of the way of solving any problems related to innovativeness on a regional level (Kogut-Jaworska, 2012, p. 138).

Network relations of regional entities are those between tertiary education institutions, business institutions, social institutions, financial institutions, enterprises, social groups building a social capital, institutions fostering engagement and activation of innovativeness and entrepreneurship. Network relations fall within the area of interest shared by authors of many research studies and analyses being part of the literature on the subject, including in particular (Martins, 2016; Sorama, 2020; Tumbas et al., 2013; Nguyen, Marques, 2022). Internal and external network relations (diffusion), shape the community life standards (regional tolerance), and specify behavior standards for entities, promote and reward regions with high standards of human capital (region's talent) as well as knowledge of innovation flow in the science – business area, i.e. regional innovativeness (Makiela, 2018).

Smart specialization strategies, in turn, are the strategies that until recently were considered to be an iteration of the innovation policy (Mazzucato, 2012; Gianelle et al., 2020; Ghinoi et al., 2021) which developed in Northern Europe over the recent decades (Grillitsch, Asheim, 2018; Gianelle et al., 2020; Gianelle, Guzzo, Mieszkowski, 2020; Tripl, Zukauskaitė, Healy, 2020). They constitute the key element of the EU Cohesion Policy based on the concept of the regional innovation system (RIS). The cooperation discourse and development of institutional capabilities that promote it are applied in order to stimulate innovations, entrepreneurship and knowledge creation (this topic is further discussed in: Foray, David, Hall, 2011; Foray, Mowery, Nelson, 2012; Foray, Rainoldi, 2013; Foray, 2015, 2018).

Regional stakeholders, who interact in the region, and network relations also give rise to regional innovation strategies which most often are part of a smart specialization strategy (or its counterpart). However, the approach based on regional smart specialization strategies (RIS3) departs from the assumption that the entities in the subsystem of knowledge application and the subsystem of knowledge generation co-operate actively, thus facilitating regular exchange of knowledge, resources, and human capital (McCann, Ortega-Argilés, 2015). Even though the concept is widely praised, its critics claim that it tends to provide a static picture of random actors and institutions, reducing the analysis to a description of the “system” that resembles an inventory (Nieth, 2019; Uyarra, Marzocchi, Sorvik, 2018). In other words, the systematic approach RIS3 is criticized for presenting the current situation without offering any heuristic tools that help understand how to design changes in the region. It is at that point where regional partnerships come into play, which provide a dynamic form other than the one caused by the static approach to RIS3 (Nieth, 2019).

Research studies regarding various aspects of network relations within the framework of regional partnerships still seem to be fragmentary. On the one hand, hindered access to the literature on development of capabilities in that area may influence the emerging new regional perspective, on the other hand it restrains cognitive capabilities regarding active interactions and cooperation between interested parties, as a contribution to regional progress. Even though researchers take attempts to carry out studies in that regard, there is still a lack of coherent analyses that synthesize both the knowledge about innovation-oriented network relations and experiences derived from implementation of smart specialization strategies.

2. Methodology and research results

The objective of this research study is to assess the research structure regarding network relations within the framework of regional partnerships for smart specialization strategies (RIS3) and to identify any research gaps in that area. Although the literature on the subject reveals a lot of knowledge related to the leading topic, what it still lacks is current exploration

of relations between individual constructs. This study focuses on identification of research themes addressed in the literature on the subject over the past decade (2012-2022) and it is based on the data derived from the Web of Science database – a set of bibliography and abstract databases created by Clarivate Analytics, covering many disciplines of research and intended for both searching information on a given topic and carrying out analyses of issues within specific publications (knowledge mapping).

Analysis of bibliometric data (bibliometrics), along with the tools for knowledge mapping, goes hand in hand with the currently emerging techniques that support observation and anticipation of science development. For example, Porter et al. (Porter et al., 2004, pp. 290-291) in their paper provided characteristics and comparison of as many as 51 detailed methods applied to attain the goals in question. A review of possible ways of measuring and observing the development of science, technology and innovation was extensively presented by (Klincewicz, Żemigła, Mijal, 2012, p. 34). In its principle, analysis of bibliometric data is compliant with the evidence-based policy model predicated on the use of analyses and research results in decision-making processes.

The choice of the bibliometric technique to run the analyses being part of this research study was advocated by its numerous methodological advantages and the assumption that the analyses are (Klincewicz, Żemigła, Mijal, 2012, p.39):

- quantitative – objectivized, precise, coherent and hard to be manipulated,
- standardizable – which makes it possible to compare the research areas or units of diverse productivity,
- direct – easy to interpret,
- based on publications and citations – i.e. measurable research outcomes rather than expert opinions on achievements, which are difficult to verify,
- characterized by a short time span – from the time of carrying out the analyses to obtaining their results,
- scalable – making it possible to analyze both small as well as very big data sets,
- making it possible for independent persons to run the analyses – in most cases analyses may be conducted by analysts who do not run their own research studies in the analyzed area, and therefore do not represent interests of any of the assessed entities,
- non-invasive – they do not require gathering of data via surveys or interviews, they may be run many times based on the available databases.

In the process-based approach, the systematic literature review (SLR) covered a set of subsequent, closely interrelated phases, including (1) formulation of the research goal and research questions, (2) specification of the database and selecting the literature set, (3) selection and pre-assessment of the data set, (4) analysis and synthesis of the data, and finally (5) results. The aggregate review covered marshalling, organizing, superstructure and also discovering the

knowledge within the existing research gaps, and it was based on the methodology proposed by Klimas et al. (Klimas, Stanczyk, Sachpazidu-Wojcicka, 2020, p. 43).

The analysis of trends observed over the past 10 years in research studies on the topic in question was first based on research & development processes and scholarly achievements presented in 28,688 academic publications, including those connected with the issues of smart specialization (1,575) and of partnership for innovation (27,113). The data distribution for the individual years is presented in Fig. 1.

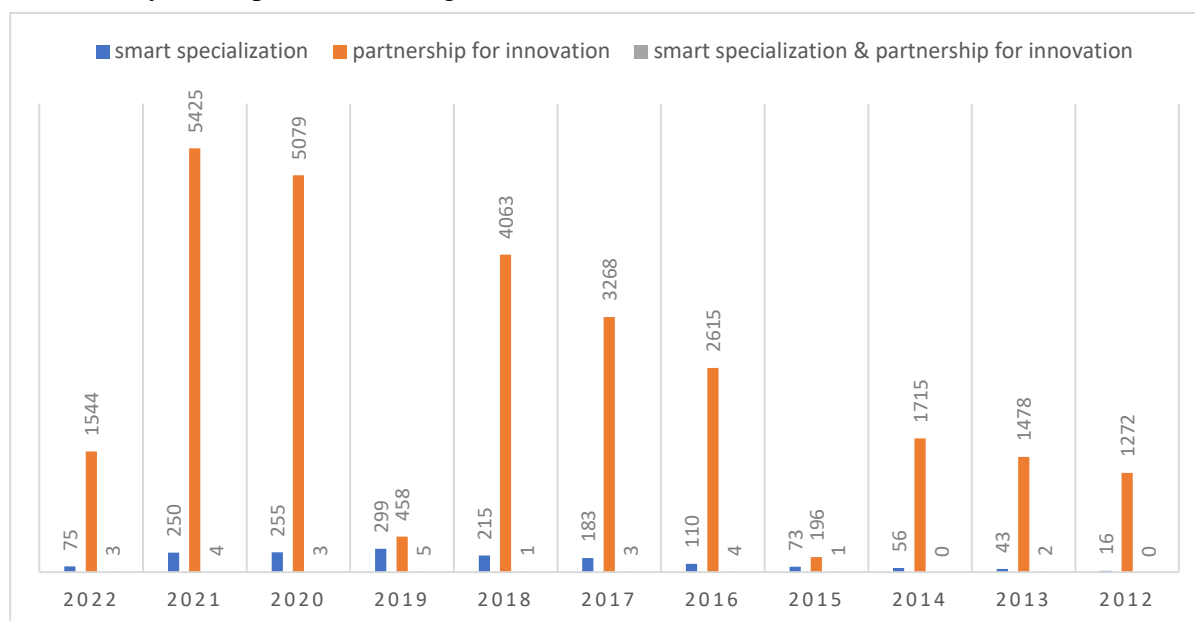


Figure 1. The number of publications dedicated to smart specialization and partnerships for innovations in the 2012–2022 period in the Web of Science database.

Source: own study based on statistical data provided by WoS.

The second stage of the selection, the so called a posteriori selection, ensuing from the combination of two applied phrases, which significantly reduced the number of publications to be analyzed, was connected with implementation of the criteria for selections that generalize the results. To visualize the synthesis of the research results, the study applied the VOSviewer software tool which is intended for construction and visualization of bibliometric networks (VOSviewer version 1.6.18) – cf. Fig. 2 and 3.

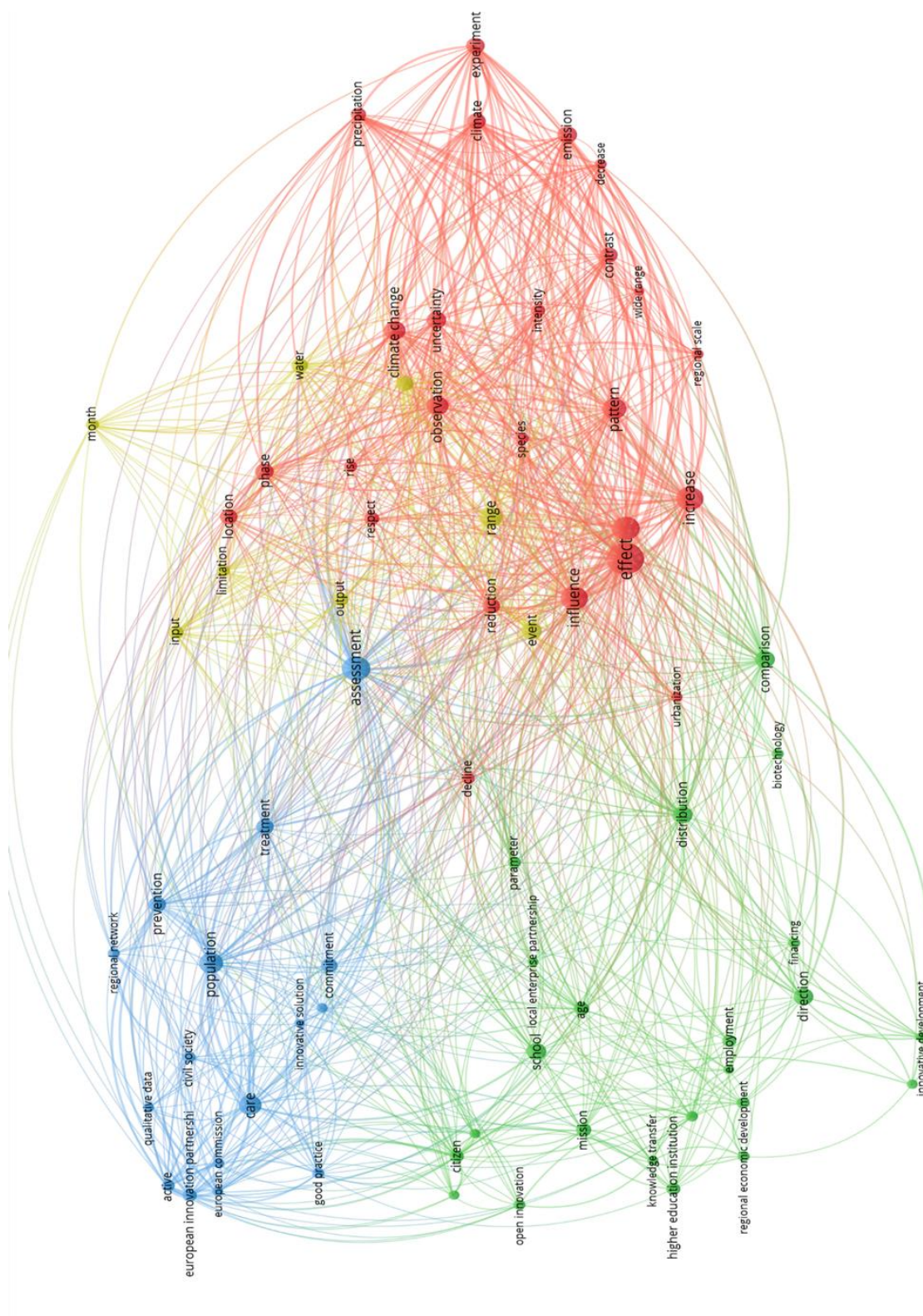


Figure 2. Map showing the intensity of co-occurrence of relations between the key phrases “smart specialization & partnership for innovation”.
Source: own study based on data derived from WoS database, VOSviewer visualization

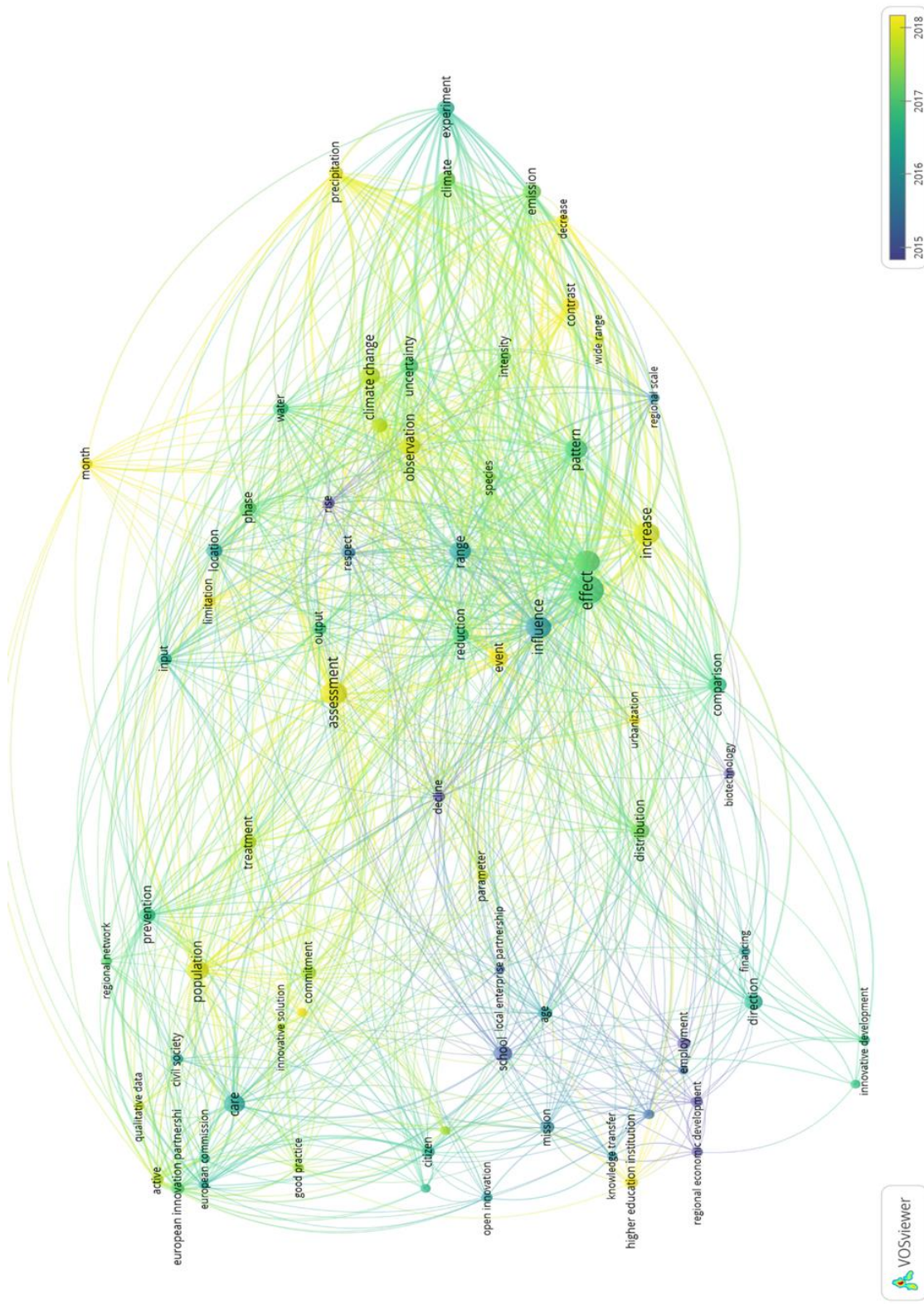


Figure 3. Map evaluating the co-occurrence of relations between the key phrases “smart specialization & partnership for innovation” – relations revealed over the recent years.

Source: own study based on data derived from WoS database, VOSviewer visualization.

The results of the research positioning and identification of trends in the analyzed area have forced extraction of labels and terms that are factually unconnected with the research area in question, which in consequence made it possible to identify the current interdependencies (co-occurrences) and relations in terms of time (evolution). As part of the analyses, the labels were categorized into clusters, based on occurrence and strength of their interconnections (Table 1). The individual clusters were color-coded; the size of the elements (labels and nodes) presented on the map has shown the frequency of occurrence of a given term, whereas the connections between the network nodes have demonstrated the strength of their co-occurrence in the analyzed set of publications.

As a result, three major clusters were obtained, showing evident affinity and density being the evidence of the existing relations, namely:

1. cluster – partnership for innovation focused around the issues connected with the triple helix (green color) – covering labels such as: commercialization, distribution, employment, financing, higher education institution, innovative development, knowledge transfer, local community, local enterprise partnership, medium enterprise, open innovation, public administration, regional economic development, smart city;
2. cluster – partnership for innovation focused around the issues connected with sustainable development (blue color) – covering labels such as: civil society, European Commission, European innovation partnership, innovative solution, population, prevention, regional network, sustainable development goal;
3. cluster – partnership for innovation focused around the issues connected with climate changes (red color) – covering labels such as: climate, climate change, emission, location, observation, precipitation, regional scale, respect, species, uncertainty, urbanization.

The map evaluating the co-occurrence of relations over time (Fig. 3) has shown that most of the highlighted issues has been discussed in the literature over the recent years, which may be a proof that the issues addressed are being developed or are at the onset of development.

Table 1.
Specification of labels and their weights within their interconnections in the so called clusters

id	label	x	y	cluster	weight <Links>	weight <Total link strength>	score <Avg. pub. year>	id	label	x	y	cluster	weight <Links>	weight <Total link strength>	score <Avg. pub. year>
1	active	-0.8894	0.5398	3	27	72	14 2017.5714	37	limitation	0.3814	0.444	4	31	43	14 2018.8571
2	age	-0.525	-0.1826	2	29	48	19 2016.0526	38	local community	-0.7816	0.0035	2	18	19	10 2017.5
3	assessment	0.1789	0.2114	3	51	150	66 2017.8636	39	local enterprise partnersh	-0.4273	-0.0978	2	12	13	10 2015.4
4	biotechnology	0.0038	-0.5278	2	10	10	12 2012.25	40	location	0.4916	0.4356	1	30	51	24 2016.2083
5	care	-0.7226	0.3956	3	33	83	43 2016.3023	41	main objective	-0.7463	-0.3778	2	21	27	12 2015.4167
6	citizen	-0.8279	0.0347	2	33	54	17 2016.4706	42	medium enterprise	-0.6501	-0.4413	2	14	17	11 2015.4545
7	civil society	-0.6245	0.5046	3	15	19	14 2016.2143	43	mission	-0.1874	-0.1871	2	23	30	20 2015.8
8	climate	443771	-0.0008	1	38	137	29 2017.2414	44	month	0.6832	0.6726	4	24	36	14 2018.2143
9	climate change	0.878	0.1435	1	40	131	39 2017.6154	45	observation	0.722	0.0693	1	44	130	38 2017.7895
10	commercialization	-0.7177	-0.466	2	15	20	14 2013.7857	46	open innovation	-0.9293	-0.0746	2	13	15	12 2016.0833
11	commitment	-0.4341	0.2577	3	31	40	22 2017.5	47	output	0.3204	0.238	4	36	55	18 2016.8333
12	comparison	0.1983	-0.5043	2	39	87	31 2016.8065	48	parameter	-0.2212	-0.0653	2	21	32	15 2017.7333
13	contrast	1.0329	-0.2312	1	31	72	24 2018.25	49	pattern	0.716	-0.2412	1	42	122	45 2016.9111
14	decline	-0.048	0.0157	1	25	37	14 2014.7857	50	phase	0.5858	0.3712	1	36	64	27 2017.037
15	decrease	1.222	-0.2171	1	31	62	12 2019	51	population	-0.4289	0.4661	3	47	105	45 2017.8222
16	difference	0.4699	-0.2617	1	49	168	59 2017.0169	52	precipitation	488332	0.2081	1	34	109	20 2017.85
17	direction	-0.4988	-0.5717	2	21	40	30 2016.4667	53	prevention	-0.3084	0.5606	3	31	73	26 2016.7692
18	distribution	-0.1235	-0.3604	2	43	78	30 2017.2	54	public administration	-0.68	-0.7638	2	7	12	10 2016.7
19	effect	0.4052	-0.2601	1	57	275	106 2016.934	55	qualitative data	-0.7287	0.5747	3	12	14	10 2017.7
20	emission	334930	-0.1592	1	30	92	31 2017.2258	56	range	0.4915	-0.0257	4	41	116	41 2016.2195
21	employment	-0.5898	-0.443	2	10	12	16 2014.625	57	reduction	0.3073	-0.0248	1	42	78	26 2016.8077
22	european commission	-0.8439	0.4522	3	17	25	11 2016.4545	58	regional economic develop	-0.8278	-0.4684	2	10	16	13 2013.6154
23	european innovation partners	-0.9091	0.5018	3	28	75	16 2017	59	regional network	-0.4087	0.6356	3	23	30	12 2017
24	event	0.2568	-0.0963	4	41	91	36 2017.9722	60	regional scale	-0.3881	-0.3881	1	20	36	12 2015.8333
25	experiment	1013550	0.0019	1	32	106	27 2016.4444	61	respect	0.4884	0.1852	1	30	47	20 2015.65
26	financing	-0.3871	-0.5576	2	16	22	13 2016.1538	62	rise	0.5959	0.2201	1	25	35	14 2014.8571
27	good practice	-0.8631	0.2759	3	25	42	13 2017.4615	63	school	-0.6119	-0.104	2	23	34	32 2015.25
28	healthy ageing	-0.9015	0.4542	3	25	60	11 2016.3636	64	smart city	-0.909	0.0409	2	14	16	10 2016.6
29	higher education institution	-0.8961	-0.3457	2	16	20	16 2017.9375	65	species	0.6542	-0.0786	1	27	45	14 2017.2857
30	increase	0.5312	-0.3741	1	50	191	58 2017.7931	66	sustainable development	-0.5215	0.2701	3	17	19	11 2019.3636
31	influence	0.3253	-0.1714	1	49	163	61 2015.9508	67	treatment	-0.149	0.371	3	38	74	24 2017.625
32	innovative development	-0.582	-0.7794	2	11	17	13 2016.7692	68	uncertainty	0.8987	0.0716	1	38	116	33 2017
33	innovative solution	-0.5529	0.3085	3	16	21	9 2017.5556	69	urbanization	0.1202	-0.3505	1	22	38	12 2018.5
34	input	0.2537	0.5274	4	33	58	19 2016.4211	70	variation	0.768	0.1266	4	35	87	26 2017.6538
35	intensity	0.9199	-0.1077	1	29	64	17 2017.1765	71	water	0.8057	0.3102	4	35	65	22 2016.8182
36	knowledge transfer	-0.8376	-0.3082	2	15	22	11 2016	72	wider range	0.9585	-0.2844	1	21	29	10 2017.7

Source: own study based on data derived from WoS database, computations: VOSviewer

3. Results

The completed literature review based on the selected publications made it possible to identify several key issues connected with searching for a gap in the network relations for smart specialization strategies.

Firstly, the WoS database, which makes it possible to browse bibliography records of major periodicals, summaries of conference proceedings (as well as to analyze citations of publications or authors), contains few publications that combine the topic of partnership for innovation with the topic of smart specialization strategies. There are many studies regarding partnerships and innovations, which focus either on the kinds of entities involved in the partnerships or on the kinds of activities the partnerships engage in. On the other hand, there is a considerable, though incomparably smaller number of publications regarding smart specialization strategies (cf. Fig. 1). In a synergistic combination of the two labels there is a limited (not exceeding 30 items) set of publications that address the topic not only on the European (Kempton, 2015; Virkkala, Mäenpää, Mariussen, 2017; Meyer, Gerlitz, Klein, 2022), but also global scale (e.g. (Monardo, 2019; Parisi, Biancuzzo, 2021; Ivashchenko, Kornyluk, Polishchuk, 2021; Ward et al., 2021).

A detailed analysis of the content of the selected set of publications, as per the three major clusters generated with the use of VOSviewer, demonstrated unambiguously that the approach to building network relations within the framework of partnerships for implementing smart specialization strategies is changing. Currently, network relations and partnerships are deeply rooted in the EU policies, such as those related to sustainable development, support for European Green Deal implementation, the EU industrial policy strategy, Horizon Europe programme, the Cohesion Policy. Building network relations for smart specialization refers to fragmentation of the EU initiatives and funds, eventually combining them under the umbrella of integrated partnerships.

Moreover, what is becoming more and more prominent is the need to focus on the development trends that lead to additional benefits for the economy, society and environment and, importantly, preference for partnerships that bring additional benefits in all the three dimensions at the same time. It is also emphasized that there is a need for running in-depth analyses which would pertain to extensive deliberations on how to stimulate stakeholders in partnerships based on current challenges and capabilities of regional transformation.

The completed analyses make it possible to state that currently the network relations require the use of a wider range of political tools in order to have an impact within a specified time frame. There is also a need to specify and introduce solutions for which time is critical – i.a. counteracting the climate changes, preserving specified levels of employment or securing the position of European regions in the emerging value chains, which means putting more emphasis on investments in innovations that are merely risky (e.g. adaptation of proven technologies) rather than explicitly uncertain.

Meeting the challenges that are critical in terms of time also requires coordination with policy areas in addition to research and innovation, which support dissemination of key innovations, and also introducing new ways of working among stakeholders, which ensures better synergy stimulation and harmonization of efforts made by each of the parties. However, a question arises: to what extent the enhanced and extended participative management makes it possible to identify and justify the ambitious goals of network relations and whether or not this is sufficient for the purposes of co-developing the paths for regional transformations based on innovations.

4. Conclusion

Network relations created within the framework of regional partnerships currently fit into the strategic frameworks featuring strong ambitions in the area of systemic transformation of regions. In connection with smart specialization strategies, they more and more often refer to European Green Deal and the possibilities and challenges connected with policies pursued in specific places. In the context of the EU policy, the partnerships also rely on positive experiences ensuing from implementation of smart specialization strategies (RIS3) and strive to promote transformative innovations, putting strong emphasis on Sustainable Development. This new, innovative approach shows considerable potential to meet the challenges of sustainable development, bringing additional benefits for the economy, society, and environment. The analyses completed as part of the study have unambiguously confirmed this direction of pro-innovative activity, and at the same time have shown that this is a niche issue and it is entering the stage of intensive development. The identified research gaps indicate that these issues are still emerging and for both practitioners and theoreticians they constitute considerable cognitive potential.

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