

## RESPONSIBLE RESEARCH AND INNOVATION (RRI) IN REGIONAL INNOVATION STRATEGIES (RIS) – RELATED PRACTICES IN THE POLISH INNOVATION ECOSYSTEM

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**Purpose:** The purpose of the paper is to investigate and identify the RRI (Responsible Research and Innovation) related practices within the Polish innovation ecosystem.

**Design/methodology/approach:** The article uses the analysis of regional strategic documents which are regional innovation strategies of provinces of Poland. Key words related to the assumptions of RRI were identified, and a congruence analysis of their meaning was conducted. This enabled the creation and presentation of quantitative summaries of the identified and verified concepts included in the strategy documents.

**Findings:** The analysis conducted shows limited presence of the RRI concept in Polish regional innovation strategies. In detail, the frequency of the occurrence of individual concepts in the aggregate and regionally was shown. Those components of the RRI that generally did not occur in the analyzed documents were pointed out. In the methodological layer, the challenges relating to the conducted study and methods of overcoming them were presented.

**Research limitations/implications:** For reasons of completeness, the authors decided to use in the analysis the strategic documents of Polish provinces relating to the period 2011-2020. Some Polish regions have not prepared documents for the period 2021-2030 (Podlaskie province) or strategic documents were developed immediately for the period 2011-2030 and have not yet been updated (Łódź, Pomeranian, Warmian-Masurian provinces).

**Practical implications:** The results of the study indicate areas that should be completed when updating regional innovation strategies.

**Originality/value:** The paper presents the results of the first analysis of the compatibility of planned activities in regional innovation strategies with the RRI. The article proposes and tests a methodology that can be used to analyze documents of subsequent periods, and is a basis for further improvements.

**Keywords:** responsible research and innovation, regional innovation strategies.

**Category of the paper:** research paper, general review.

## 1. Introduction

Responsible Research and Innovation (RRI) was introduced as a term used by the European Union within its Framework Programmes. It is used for describing research and innovation processes potential impact on the environment and society (Von Schomberg, 2013; European Commission, 2013; Zwart et al., 2014; RRI Tools Consortium, 2016). Therefore Responsible Research and Innovation (RRI) anticipates and assesses potential implications and societal expectations concerning research and innovation, intending to foster their design as inclusive and sustainable.

According to current studies undertaken within H2020 projects (such as TeRRItoria, <http://territoriaproject.eu/> or FIT4RRI, <https://fit4rri.eu/>) the practical implementation of the Responsible Research and Innovation (RRI) can be demonstrated by the presence of RRI related practices in innovation policy documents implemented on various levels (local, regional and national).

In order to observe the current level of Responsible Research and Innovation (RRI) we are going to analyse one of the main instruments used for shaping the innovation policy on the regional level in Poland, namely regional innovation strategies. Regional innovation strategies are integrated, place-based economic transformation agendas. In the context of Europe 2020 strategy, they are focused on: (1) policy support and investments on critical regional priorities, challenges and needs for knowledge-based development, (2) building region's strengths and competitive advantages, (3) supporting technological as well as practice-based innovation, (4) getting stakeholders fully involved and encourage innovation and experimentation (Foray et al., 2012). RIS are characterised as evidence-based and they include sound monitoring and evaluation systems. In each of the 16 Polish regions, the regional innovation strategy has been adopted and implemented.

## 2. Responsible Research and Innovation (RRI)

Responsible Research and Innovation (RRI) is gaining raising recognition in academic literature and research practice within the European Union (EU).

RRI was included as a part of the EU Framework Programmes. In the 6th Framework Programme, where the term “responsible research” appeared for the first time, replacing the Ethical, Legal and Social Aspect (ELSA) framework for guiding research policy on emerging sciences and technologies (Zwart et al., 2014). “Responsible research and application of science and technology” has been used to describe the requirements for cooperation between various bodies to foster dialogue in a global context and research on ethics of science and technology (Burget et al., 2016).

The term “Responsible Research and Innovation” was next used in the 7th Framework Programme (Regulation (EU) No 1291/2013, 2013) and grounded in Horizon 2020, emphasising cooperation between societal actors (researchers, citizens, policymakers, business, third sector organisations, etc.) working together during the whole research and innovation process in order to align better both the process and its outcomes with the values, needs and expectations of society.

RRI is also planned to be included in the Horizon Europe, the EU research framework programme succeeding Horizon 2020, where it is going to further promoted in the Science-with-and-for-Society (SwafS) actions.

Following the interest in RRI promoted by the European Commission, especially in the recent years (2016-2020) there have been several literature studies exploring this topic (Burget et al., 2016; Carrier, Gartzlaff, 2019; Jakobsen et al., 2019; Loureiro, Conceição, 2019; Schuijff, Dijkstra, 2020; Fraaije, Flipse, 2020). The scholars argue that (1) RRI is “a relatively immature, narrow area of inquiry that takes a topdown perspective and relies on standardised principles about public governance of research and innovation” (Jakobsen et al., 2019); (2) “Although the concept of RRI occurs in different institutional documents and research publications, its definition and dimensions still lack clarity” (Owen et al., 2012; Burget et al., 2016); (3) “the concept of RRI is vague and undefined” (Rip, 2014; Zwart et al., 2014; Loureiro, Conceição, 2019).

Nevertheless, one of the first attempts to define RRI (being at the same time most frequently mentioned in the cited papers) is the one by von Schomberg (2011), in which Responsible Research and Innovation is defined as “a transparent, interactive process by which societal actors and innovations became mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (to allow a proper embedding of scientific and technological advances in our society).” (von Schomberg, 2011).

The foundation underpinning the concept of Responsible Research and Innovation are six key dimensions recommended by the Rome Declaration (2014), namely: public engagement, gender equality, science education, open access (open science), ethics and governance. However, similarly, as in the concept of RRI there is no consensus concerning these dimensions as well, as some EU documents (European Commission, 2015) refer to eight dimensions, adding to the six mentioned above: sustainability and social justice/inclusion. Furthermore, there are studies, employing a different approach and identifying four, different dimensions: anticipation, reflexivity, inclusion and responsiveness (Stilgoe et al., 2013; Jakobsen et al., 2019). What is more available studies prove that the academic literature considers some of the dimensions as more significant (namely: ethics, social engagement and governance), than the rest (Loureiro, Conceição, 2019).

Nevertheless of this argument, in this study, we use the six key dimensions with the two additional, as the most comprehensive one. The dimensions are described as follows in table 1.

**Table 1.**  
*RRI dimensions*

Dimension	Type of dimension	Description
Public engagement	Main	Maximising the number of people from the society engaged in the scientific process
Gender equality	Main	Aiming for gender balance and equality in research and innovation
Science education	Main	Focus on the communication of research principles and education equipping with RRI values
Open access (open science)	Main	Free, unrestricted and easy access to research results, data and related literature
Ethics	Main	Developing and implementing ethical standards and good practices in research and innovation
Governance	Main	Active enforcement of RRI values
Sustainability	Additional	Contribution of research and innovation to sustainable development
Social justice/inclusion	Additional	Participation of social groups in benefits arising from research and innovation

Source: Own elaboration based on European Commission (2015) and RRI Tools, <https://www.rri-tools.eu/>, 2.06.2023.

### 3. RRI and Research and Innovation Strategies (RIS3)

One of the areas noted by scholars in RRI related literature is the one linking this concept with research and innovation strategies for smart specialisation (RIS3) and regional innovation systems (Fitjar et al., 2019; Thapa et al., 2019; Rehfeld, 2019; Barton et al., 2019).

The literature on the relation of RRI with RIS3 or regional innovation is scarce, almost non-existent. Searches in Web of Science and Scopus resulted in identifying only 4 papers (included in both databases) that linked the concept of RRI with “regional innovation” and only 1 of them addressed RIS3 directly (Fitjar et al., 2019) and 1 addressed regional innovation studies, where some aspects of RIS3 (as innovation policy) were analysed indirectly (Thapa et al., 2019).

In the selected papers, RRI, as already mentioned, is presented as an innovation policy foregrounding the responsibility of researchers and innovators towards society, mostly promoted by Horizon 2020 related calls. Whereas Research and Innovation Strategies for Smart Specialisation (RIS3) were introduced as an innovation development tool at a regional level. The EU programming period 2014–2020 required regions to develop so-called “smart specialisation strategies”, in line with RIS3, as a condition for accessing to European Structural and Investment Funds, making RIS3 an essential part of EU’s cohesion policy.

RRI and RIS3, both being innovation policies, have common elements, such as: focus on broad stakeholder involvement in the development of innovation policy and implementation of innovation processes, as well as emphasise the need for research and innovation to solve societal challenges.

Fitjar et al. (2019) argue that “despite the apparent similarities between RRI and RIS3, there are substantive differences in their design and implementation, notably in the theories on which they build, and the networks, norms, and practices with which they have become associated”. The two differences noted by Fitjar et al. (2019) include: lack of regional (geographical) focus and ambiguous definition of the society/societal actors (stakeholders) in RRI. Further, the authors propose to include Stilgoe et al.’s (2013) RRI framework to RIS3 and include the following dimensions: anticipation, reflexivity, inclusion and responsiveness in research and innovation strategies to incorporate a responsible approach to smart specialisation. This paper doesn’t, however, take into account the six key dimensions of RRI recommended by the Rome Declaration (2014): public engagement, gender equality, science education, open access (open science), ethics and governance. The authors of the discussed paper didn’t also attempt to empirically verify whether any aspects of the RRI concept are included and used in RIS3.

Lack of sufficient focus on the influence of RRI and regional innovation is supported by Thapa et al. (2019), who view this relation in the light of regional development. Authors of the paper note that “RRI debate is highly compatible with regional innovation studies” by providing governance dimension and guidance on drivers and tools for more responsible regional innovation policies. They also further provide examples on how RRI concept can support regional innovation policies, however, the cases remain general without addressing the specific actions taken on the regional level as a part of the innovation systems and ignore RIS3 as EU’s regional innovation policy.

Despite the small number of papers linking RRI with RIS3 and regional innovation systems, the relation seems to be important, as both concepts are part of EU innovation policy. Although they address different levels (general vs. regional) there is a need to align these two concepts to reinforce EU’s innovation policies towards a more sound approach and as a result, provide a harmonised effect on responsible and sustainable outcomes of innovation activities for regional development.

This study is an attempt to bridge the identified literature and research gaps and to investigate to what extent are the RRI principles empirically are present in RIS3-based regional innovation system. Furthermore, we discuss how the regional innovation strategies can be reinforced with RRI principles. For this reason, we analysed 16 regional innovation strategies, that create framework for regional public support for innovation ecosystem in Poland.

#### **4. RIS3/Regional innovation strategies in Poland**

Poland has been a member the European Union since 2004. As member state Poland and Polish regions have their share in EU policies. Polish economy, after systemic transition in 1989 can be seen as European growth champion. It has more than doubled its gross domestic product

(GDP) per capita in last 20 years, coming in ahead of all European peers. It was the only EU economy to avoid the 2008-2009 global financial crisis. However with only two-thirds of the level of income of the euro zone, Poland is still far from full convergence with the West. Although midterm growth prospects are positive, Poland's longer-term growth prospects will depend on its ability to further reform higher education, stem demographic decline, and—above all—enhance innovation (World Bank Group, 2016). Unfortunately Poland is a regional laggard in terms of innovation outputs, e.g. the levels of total and private R&D spending are below the European average and regional peers (Regional Innovation Scoreboard, 2019). The innovation outputs are also underperforming. The economy's exports are mostly based on low-tech rather than high-tech industries. Poland continues to compete largely on price rather than on the quality of its products and services (World Bank Group, 2016).

RIS3 is one of tools which aims to strength innovation focus in policy and economy. Poland has developed separate RIS3s at the national and regional levels, so all of 16 of Polish regional governments had developed their own RIS3s. Some of them were voluntarily submitted for the review of the European Commission as a part of a mandatory package related to the ROPs (World Bank Group, 2016). The European Commission accepted all regional and national operational programs in February 2015.

At the country level, there remains fragmentation in the RIS system and there is no clear leadership of the RIS3 process in Poland. Governance is divided between MRiT (Ministry of Economic Development and Technology) and MEiN (Ministry of Education and Science). The regional dimension of RIS3 implementation in Poland is the responsibility of the Marshal's Office within each region (marshals are the regional heads of government) and is coordinated by the Ministry of Infrastructure and Development. The present approach highlights each region as a separate entity and does not promote a strong linkage with national priority setting (Miler et al., 2014). Regions differ significantly with respect to the organisational structures used to implement and monitor RIS3 (Sołtysiak, Wyrwa, 2017).

As research by World Bank Group (2016) indicates there are differences in the quality of RIS3 at the regional level. The process of RIS3 preparation began in some regions on the basis of an old style top-down process, with little involvement from other stakeholders, especially from SMEs. In a number of cases, the evidence supporting the choice of regional smart specializations left scope for improvement. In general, there are important regional differences between RIS3 development procedures.

## **5. Research methodology and results**

In order to analyse whether the RRI principles are present in RIS3-based regional innovation system, we analysed 16 regional innovation strategies (RIS), that underpin the

innovation ecosystem in Poland. To evaluate the RRI presence we used the six key dimensions of RRI: public engagement, gender equality, science education, open access (open science), ethics and governance supported by the two additional ones: sustainability and social justice/inclusion. The dimensions were considered as keywords that were further expanded into sets of keywords for each dimension.

**Table 2.**

*Main and additional keywords used in research*

Main keyword	Additional keywords included in the analysis
Public engagement	Participation Social Society
Gender equality	Man Woman Men Woman
Science education	Promotion (of science) Dissemination Communication
Open access (open science)	Free
Ethics	Ethical
Governance	Management Implementation (of RRI principles) Promotion (of RRI principles) Information (about RRI principles)
Sustainability	Sustainable development CSR – corporate social responsibility Environmental Eco-innovation Ecology
Social justice/inclusion	-

Source: Own research.

As the documents analysed in our research were in Polish, we had to consider all grammatical forms of the given keywords, which in the Polish language included declension and what was not possible to present in table 2. Furthermore, we found some of the keywords overlapping (as in the case of “promotion” that was included both in the “Science education” and “Governance” dimensions), however, we decided to include it in both dimensions in order to analyse a high number of synonyms associated with the main keywords and different RRI dimensions. Finally, we found this overlap to be both direct and indirect. While looking for connections of RIS3 documents with RRI principles in one dimension, we focused on identifying connections with other dimensions as well. This was the case of the keyword “engagement” from the “Public engagement” dimension, that allowed us to find also connections with the “Social justice / social inclusion” dimension, although we did not consider the keyword “engagement” as connected with this second dimension.

The bodies responsible for the development and implementation of the Regional Innovation Strategies in Poland were the Marshall Offices of each of the 16 Polish regions. The full texts of the documents for the analysis were available in open access and were retrieved either from the Marshall Office’s webpage or its public information bulletin (being part of it).

The RIS3 documents we analysed were not developed according to one standard. This meant that the documents were different in structure, sometimes covering both the “diagnostic part” which led to its development (including, e.g. SWOT analysis of the region) and “strategic part”, including recommendations for the regional innovation strategies and smart specialisation selection and sometimes covering only the main, strategic part. Additionally, the lack of standardisation influenced the volume of the analysed documents. We found some of them to be extensive and detailed 200+ pages documents, whereas almost half of them (7/16) was less extensive and more general, counting from 60 to 90 pages. The total volume of the RIS3 documents counted to almost 2100 pages. Each author reviewed the full text of 8 Regional Innovation Strategies, being equivalent of half the total number of the pages. Additionally, the two sub-samples were divided to include both longer and shorter documents so that every author could review different types of texts.

As the main part of our study, we analysed the documents and counted the occurrences of the main and additional keywords. We identified two types of occurrences: (1) “occurrence in RRI meaning” and (2) “occurrence in RRI-related meaning”. We considered the first case as descriptions that would directly refer to the definition or principles of RRI or the description of the analysed dimensions. We considered the second case as descriptions that would refer to RRI dimensions but were used in the RIS3 documents in other meanings.

Furthermore, we divided the identified occurrences into two additional groups: (1) “occurrences in the diagnostic part”, referring to the “diagnostic part” of the RIS3 documents (if such was included) and (2) “occurrences in the strategic part”, referring to the “strategic part” of the RIS3 documents (present in all of them).

As a result of the conducted study, we were able to identify the occurrences of the keywords by the analysed regions (Table 3) and by RRI dimensions (Table 4). Additionally, the detailed results presented both by regions and by RRI dimensions are presented in Appendix 1.

In case of the analysis by regions we were able to identify a total number of 6431 occurrences of the analysed keywords, however only in 375 cases, they were used in RRI meaning (58 in the “diagnostic part” and 317 in the “strategic part”). Additionally, we found 155 occurrences in RRI-related meaning (37 in the “diagnostic part” and 118 in the “strategic part”).

The regions with the highest number of occurrences of the keywords in RRI meaning were: Malopolskie (Lesser Poland) – 96; Podkarapckie (Subcarpathia) – 65 (both in the “diagnostic part” and “strategic part”) and Zachodniopomorskie (West Pomeranian) – 57. In the same time in RIS3 documents of 6 out of 16 regions we were unable to find any occurrence of the keywords in RRI meaning: Dolnoslaskie (Lower Silesian); Lubelskie (Lublin Province); Lubuskie (Lubusz); Slaskie (Silesia); Swietokrzyskie (Holy Cross Province); Warminko-mazurskie (Warmia-Masurian). Table 3 provides a complete summary of the results obtained.



**Table 3.***Research results – occurrences of keywords by regions – RIS strategies for 2011-2020*

Region in Polish	Region in English	Number of keywords occurrences	Total occurrences in the diagnostic part		Total occurrences in the strategic part	
			Total occurrences in RRI meaning	Total occurrences in RRI-related meaning	Total occurrences in RRI meaning	Total occurrences in RRI-related meaning
Dolnoslaskie	Lower Silesian	500	6	8	0	4
Kujawsko-pomorskie	Kuyavia-Pomeranian	524	0	0	38	10
Lodzkie	Lodz Province	937	6	6	27	9
Lubelskie	Lublin Province	233	0	1	0	4
Lubuskie	Lubusz	292	6	3	0	2
Malopolskie	Lesser Poland	798	0	0	96	4
Mazowieckie	Masovian	638	2	6	1	21
Opolskie	Opole Province	272	0	0	38	21
Podkarpackie	Subcarpathia	252	35	4	30	4
Podlaskie	Podlasie Province	57	3	0	2	1
Pomorskie	Pomerania	235	0	0	25	17
Slaskie	Silesia	240	0	0	0	6
Swietokrzyskie	Holy Cross Province	155	0	0	0	4
Warmińsko-mazurskie	Warmia-Masurian	273	0	1	0	0
Wielkopolskie	Greater Poland	374	0	2	3	4
Zachodniopomorskie	West Pomeranian	651	0	6	57	7
TOTAL		6431	58	37	317	118

Source: Own research.

The second part of our analysis focused on the identification of occurrences of the analysed keywords by RRI dimensions. The dimensions with the highest number of occurrences of the Keywords in RRI meaning was “Sustainability”, which with the total number of occurrences of 962, it appeared in RRI meaning in 264 cases. As for the rest of the dimensions, their presence was significantly less visible. The second two dimensions with the highest number of occurrences of the related keywords were “Social justice / social inclusion” – 50 and “Public engagement” – 40.

In case of 3 dimensions we were not able to find any occurrence of the analysed keywords in RRI meaning, namely: “Gender equality”; “Open access/open science” and “Ethics”. Please consult Table 4. for the rest of the results.

**Table 4.**

*Research results – occurrences of keywords by RRI dimensions – RIS strategies for 2011-2020*

RRI Dimension	Number of keywords occurrences	Total occurrences in the diagnostic part		Total occurrences in the strategic part	
		Total occurrences in RRI meaning	Total occurrences in RRI-related meaning	Total occurrences in RRI meaning	Total occurrences in RRI-related meaning
Public engagement	1760	2	6	38	13
Gender equality	30	0	1	0	0
Science education	1002	1	1	17	45
Open access (open science)	224	0	7	0	10
Ethics	4	0	3	0	0
Governance	2250	0	2	3	33
Sustainability	962	40	16	224	17
Social justice/inclusion	199	15	1	35	0
Public engagement	6431	58	37	317	118
TOTAL:	1760	2	6	38	13

Source: Own research.

We analyse number of regional innovation strategies with occurrence of the analysed keywords. The dimension with the highest number of regions with keywords occurrence in RRI meaning was “Sustainability”, with total number of 10 regions. This keyword occurred in every strategy which mentioned keywords in RRI meaning. Two of keywords occurred in four regional strategies – they were “Public engagement” and “Social justice/social inclusion”. “Science education” appeared in two regions and “Governance” in only one region.

**Table 5.**

*Research results – no of regions with occurrence of keywords in the analysed dimensions – RIS strategies for 2011-2020*

RRI Dimension	Total occurrences in the diagnostic part		Total occurrences in the strategic part	
	Total occurrences in RRI meaning	Total occurrences in RRI-related meaning	Total occurrences in RRI meaning	Total occurrences in RRI-related meaning
Public engagement	1	4	4	5
Gender equality	0	1	0	0
Science education	1	1	2	7
Open access (open science)	0	2	0	5
Ethics	0	1	0	0
Governance	0	1	1	7
Sustainability	5	6	10	7
Social justice/inclusion	3	1	4	0
Public engagement	1	4	4	5
TOTAL:	0	1	0	0

Source: Own research.

The keyword „sustainability” has the highest frequency of occurrence. It occurs 224 times in 10 out of 16 strategies. It is used in regional innovation strategies in the four ways:

- As „sustainable development” used mainly in general meaning or in meaning focused on energy saving initiatives. In region of Subcarpatia “sustainable development” is a key priority for RIS as “Smart, sustainable and inclusive development”.
- As environmental friendly technologies in the general meaning. It is used mainly for general feature of broad range of technologies in the area of food, health and energy.
- As ecoinnovations. This term which term is heavily used in strategy documents for Subcarpatia and Lodzkie. Both regions indicated it as one of strategy activities. Region of Greater Poland focuses on ecoinnovative means of transport as its’ smart specialisation.
- As promotion of corporate social responsibility – in only one region.

Keyword “public engagement” is used in the strategies mainly in the context of public (various actors) involvement in innovation processes. None of the analysed strategies does not refer to public engagement in R&D activities.

Keyword “Social justice/social inclusion” is used in a context of social inclusion. The process of smart specialization selection should support social inclusion or - in other document - regional innovation strategy is seen as tool for increase of social inclusion level. Social inclusion can be achieved thorough support for economy characterised by high level of employment, and by economic, social and territorial coherence.

Keyword “Science education” occurs mainly in the context of promotion. Special attention is payed to various actions aimed at promotion of science with special respect to young adults. Planned actions include organising of centres for dissemination of science and technical achievements and science festivals. One of actions assume also science promotion via creation and dissemination of specialized sources of information.

Keyword „governance” occurs in one regional strategy (Lesser Poland) in the meaning of promotion. The keyword occurs in relation to promotion of environmental principles in the field of sustainable development.

## 6. Conclusions

The content analysis of the regional innovation strategies of the regions of Poland, which was carried out, points to a number of important conclusions. The key one is the very limited presence of the RRI concept in Polish RIS. In strategic documents relating to the sphere of innovation. Almost all RRI concepts appear incidentally and some are absent altogether.

To some extent, the exception is the concept of "Sustainability". It is present in 10 documents out of a total of 16. It also occurs extremely frequently, as many as 224 times. This represents 70.6% of the total number of occurrences of all RRI-related concepts analyzed, and it also means that the occurrences of "Sustainability" concepts are twice as numerous as the

total occurrences of the other concepts. Such a high result, when juxtaposed with the less numerous statistics related to the other concepts, indicates a significant unevenness in their use in RIS documents in Poland.

On the other hand, there are concepts that almost do not exist in the surveyed documents in the RRI sense. "Gender equality" occurred 30 times, but in the RRI-like sense it occurred only once, and that in the analytical part. Thus, it appears that this part of RRI policies does not appear in strategic thinking about innovation at the regional level. Concepts related to the "Ethics" dimension occurred only four times - in one RIS document and only in the analytical part.

In light of the analysis results obtained, it can be concluded that the level of consideration of RRI concepts in regional strategic documents in Poland is deeply unsatisfactory. Therefore, it can be pointed out that there is a need to strengthen awareness of this area of issues for modern innovation activities, including those relating to scientific, implementation and strictly business activities.

In the context of the analysis of the texts, there are important methodological conclusions. Its implementation involved overcoming a number of challenges. The first of these was to conduct an appropriate semantic selection of the identified words formulated in Polish. Although more than 6,400 occurrences of the search terms were identified, only 435 were identified as occurring in a meaning that coincided with the RRI and in the strategy document. This represents less than 7% of the total. This indicates the huge discrepancies in meaning, and the necessity of including them in the analysis. At the same time, it justifies the methodology used to analyze each case separately. Based, only on the statistics of occurrences of the words in question, the results of the analysis would be drastically (about 14 times) overestimated.

Another solution used was to analyze statistics taking into account the structure of strategic documents. This is because the authors assumed that for the purpose of the article, the content in the strategic part of the analyzed documents is of key importance. While the content in the analytical part, related to the evaluation and analysis of the existing state, is of supporting importance. Their appearance in this part may indicate awareness of the importance of the factors in question, but does not involve the intention to implement/support them in the future.

The realized study has limitations related to the focus on one type of strategic documents occurring at the regional level. In further steps, it would be recommended to expand the analysis to include, among others, documents relating to the strategy of provincial development, or also documents relating to regional operational programs, individual provinces. An important methodological contribution of this article to further work on the topic would be to take into account the conclusions relating to the need to conduct a detailed meaning analysis and to take into account the complex structure of the documents, and thus to concentrate work on the parts of key strategic importance.

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## Appendix 1.

*Research results – occurrences of keywords by regions and RRI dimensions (in detail) – RIS strategies for 2011-2020*

Region in Polish	Region in English	RRI dimension	Number of keywords occurrences	Occurrences in the diagnostic part		Occurrences in the strategic part	
				Occurrences in RRI meaning	Occurrences in RRI-related meaning	Occurrences in RRI meaning	Occurrences in RRI-related meaning
Dolnoslaskie	Lower Silesian	Public engagement	126				
		Gender equality	0				
		Science education	68	1			2
		Open access/open science	40				
		Ethics	3		3		
		Governance	160		2		
		Sustainability	87	4	3		2
Social justice/social inclusion	16	1					
Kujawsko-pomorskie	Kuyavia-Pomeranian	Public engagement	153			13	7
		Gender equality	0				
		Science education	124				
		Open access/open science	15				2
		Ethics	0				
		Governance	151				1
		Sustainability	74			18	
Social justice/social inclusion	7			7			
Lodzkie	Lodz Province	Public engagement	164		2	8	
		Gender equality	1		1		
		Science education	190				
		Open access/open science	20				
		Ethics	1				
		Governance	408				7
		Sustainability	141	6	3	19	2
Social justice/social inclusion	12						
Lubelskie	Lublin Province	Public engagement	58				1
		Gender equality	0				
		Science education	19				
		Open access/open science	21				1
		Ethics	0				
		Governance	77				1
		Sustainability	39		1		1
Social justice/social inclusion	19						
Lubuskie	Lubusz	Public engagement	42		1		
		Gender equality	4				
		Science education	76				
		Open access/open science	6		1		
		Ethics	0				
		Governance	100				2
		Sustainability	37				
Social justice/social inclusion	27	6	1				
Malopolskie	Lesser Poland	Public engagement	275			5	
		Gender equality	2				
		Science education	68				
		Open access/open science	72				
		Ethics	0				
		Governance	213			3	
		Sustainability	138			70	4
Social justice/social inclusion	30			18			
Mazowieckie	Masovian	Public engagement	279		1		
		Gender equality	5				
		Science education	87		1		
		Open access/open science	14				1
		Ethics	0				
		Governance	163				17
		Sustainability	74	2	4	1	3
Social justice/social inclusion	16						

Opolskie	Opole Province	Public engagement	101			12	2
		Gender equality	0				
		Science education	56				16
		Open access/open science	4				
		Ethics	0				
		Governance	76				3
		Sustainability	30			26	
Podkarpackie	Subcarpathia	Social justice/social inclusion	5				
		Public engagement	15	2			
		Gender equality	1				
		Science education	31			2	2
		Open access/open science	0				
		Ethics	0				
		Governance	1				
Podlaskie	Podlasie Province	Sustainability	173	25	4	22	2
		Social justice/social inclusion	31	8		6	
		Public engagement	8				
		Gender equality	0				
		Science education	14				1
		Open access/open science	0				
		Ethics	0				
Pomorskie	Pomerania	Governance	23				
		Sustainability	12	3		2	
		Social justice/social inclusion	0				
		Public engagement	51				
		Gender equality	0				
		Science education	64			15	17
		Open access/open science	0				
Śląskie	Silesia	Ethics	0				
		Governance	112				
		Sustainability	12				
		Social justice/social inclusion	1				
		Public engagement	59				2
		Gender equality	0				
		Science education	49				3
Świętokrzyskie	Holy Cross Province	Open access/open science	7				1
		Ethics	0				
		Governance	66				
		Sustainability	15				3
		Social justice/social inclusion	0				
		Public engagement	70				1
		Gender equality	1				
Warmińsko-mazurskie	Warmia-Masurian	Science education	2				
		Open access/open science	1				
		Ethics	0				
		Governance	175				
		Sustainability	22		1		
		Social justice/social inclusion	18				
		Public engagement	39				
Wielkopolskie	Greater Poland	Gender equality	0				
		Science education	13				
		Open access/open science	6				
		Ethics	0				
		Governance	183				
		Sustainability	38			3	
		Social justice/social inclusion	13				
Zachodniopomorskie	West Pomeranian	Public engagement	55		2		
		Gender equality	0				
		Science education	78				4
		Open access/open science	7				
		Ethics	0				
		Governance	232				
		Sustainability	60			53	2
TOTAL		Social justice/social inclusion	4			4	
			6431	58	37	317	118