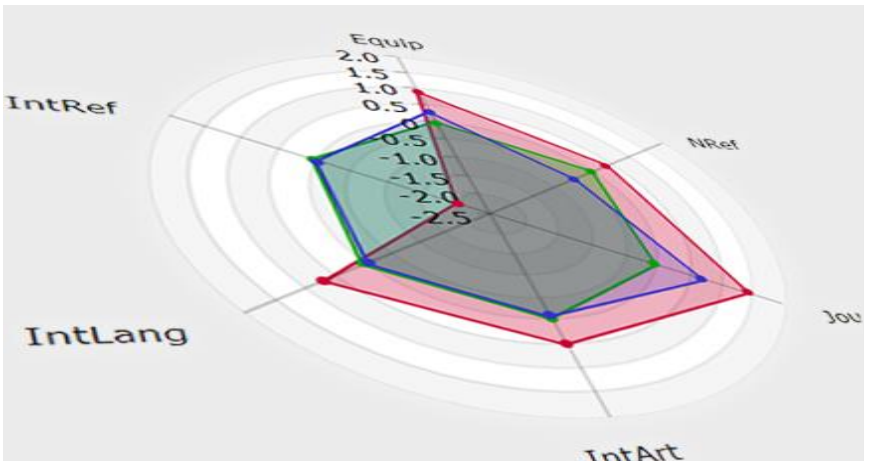
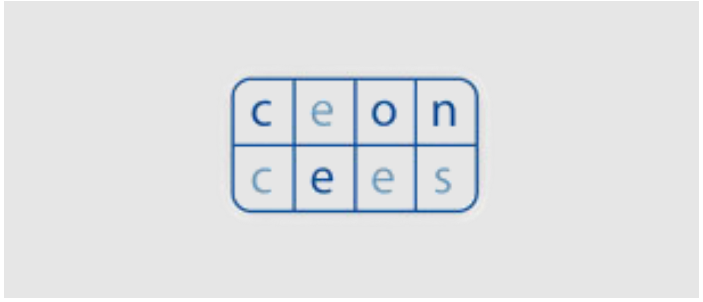
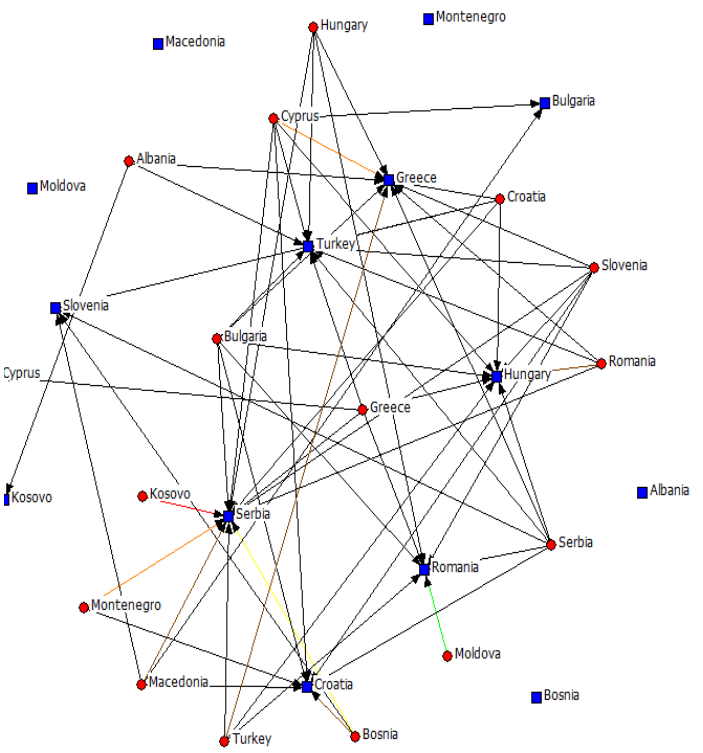




“Open SEESAmE”: A conceptual and empirical rationale behind the Southeast European scientific journal indexing and evaluation system

Siniša Subotić and Pero Šipka



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Biographical notes

Siniša Subotić is an associate professor of methodology and educational psychology at PIM University, Banja Luka, BiH. He is also active as a Research Fellow at CEON/CEES. In this capacity, he is mainly engaged in the application of advanced statistical procedures for solving research evaluation problems. His bibliography is available at https://independent.academia.edu/SSubotic.

Pero Šipka, PhD, is a trained psychologist and psychometrician. He spent most of his career in teaching statistical, methodological and informetric courses at the University of Belgrade and the University of Novi Sad. He has been concurrently serving as President at CEON/CEES from 2002 on, which gradually became his only professional commitment. His bibliography is available at http://scholar.google.com/citations?user=-uCwzKsAAAAJ

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Summary

In this paper, we describe the typical problems of the so called regional research, including the issues of poor regional journal indexing, the inappropriateness of global citation metrics for impact evaluation, and the general necessity for employing alternative measures to assess quality. We propose that simply extending the regional journals' coverage in the highest tier international indexing services such as WoS/JCR is not an optimal course of action. Instead, we argue for the making of middle tier regional indexing and evaluation services, which would complement the international ones. Under this paradigm, regional journals would be evaluated by regional impact factors, in conjunction with the so-called indicators of (formal) bibliometric quality (which are mostly derived from the Thompson Reuters admission criteria). We concentrate our efforts on the Southeast European (SEE) scientific region, proposing a system called SEESAmE. In order to empirically justify this approach and the SEE-centric system, we conducted three studies. The results of Study 1 revealed that only a small portion of SEE journals is included in major indexing services such as WoS or Scopus and that the seemingly high WoS/Scopus output of some bigger SEE countries diminishes when it is controlled for country size. This is consistent with the notion that a regional service might be useful to fill the current coverage gaps. The results of Study 2 confirmed that there is, in fact, an empirical justification for treating the SEE as a joint scientific publishing entity, as there is substantial co-authorship collaboration evident in existing WoS data. Smaller SEE countries are especially reliant upon scientific cooperation within the SEE. Finally, Study 3 confirmed that a regional impact factor is a useful complement to the impact factor calculated for the global citation data, as it taps into the effects that are under the radar of WoS and Scopus. Furthermore, indicators of bibliometric quality are highly related to the regional impact factor, and regional impact is related to global impact both directly and indirectly, with indicators of bibliometric quality partially mediating the relationship. Finally, both indicators of bibliometric quality and regional impact have an external validity, as they uniquely and incrementally predict the journals' current indexing status. All this confirms that they are useful quality proxies and tools for progress tracking. Taken together, these findings point to a conclusion that there is enough empirical justification for the SEE regional scientific indexing and evaluation initiative and its proposed concept, and we argue that a system that would be based on the SEE data (i.e. SEESAmE) would positively enhance the scientific output of the region as a whole.

Keywords: Southeast Europe (SEE); regional impact factor; indicators of bibliometric quality; co-authorship, scientific journal evaluation; SEESAmE.

Introduction

So called 'regional research' , i.e. research "where scientists and scholars report on the agricultural, climate, social, economic, and other location-specific challenges facing a nation or region" (Scolarone Thompson Reuters, 2012, p. 5) seems to be in a highly unfavorable position when judged on the basis of currently predominant global citation metrics, such as the journal impact factor. While the problem itself is global, its solution might in fact be local. In this paper, we present this problem and propose a framework for its solution, with the focus on the Southeast European (SEE) scientific region.

Regional research: Basic issues

Historically, fields and disciplines which frequently deal with specific non-English language related and regional research topics, such as the humanities or social sciences, tend to be underrepresented in the major international databases in comparison to natural sciences and engineering (Archambault, Vignola-Gagné, Côté, Lariviere, & Gingras, 2006). Furthermore, authors from 'non-Western' (and Japan) countries generally experience much higher rejection rates (Scolarone Thompson Reuters, 2012). This can partially be explained by issues of quality, but arguably even more by language issues (Scolarone Thompson Reuters, 2012). Also, it does not necessarily accurately reflect the importance of the research, as its local value might as well outweigh the global impact (Monjeau, Rau, & Anderson, 2013; Scolarone Thompson Reuters, 2012). In other words, many research topics that are highly relevant for specific regions might not be as interesting for international audiences, which in turn might lead to modest citation counts and consequent assessments of lower importance than the research actually has.

Still, a recent evaluation showed that out of 10.000 considered regional journals, only 16% met the formal Thompson Reuters inclusion criteria (Testa, 2011). Additionally, several writing and citing practices that may be acceptable in certain countries and cultures may not be compatible with the generally accepted international scientific publishing trends (Scolarone Thompson Reuters, 2012), and many regional researchers may, in fact, lack the necessary formal scientific writing training, as well as the necessary infrastructural support (Matković, Pejić Bach, & Radočaj Novak, 2013). Furthermore, small journals from small countries generally have modest author and reviewer pools and limited financial resources, which can all negatively impact the quality (Marušić & Marušić, 1999). Regardless of the cause – be it the lack of formal quality, the language issues, or some sort of editing, reviewing, or acceptance bias, it is clear that the scientometric evaluation of regional research should be approached with caution and that global indexing/database coverage and citation metrics might not be the appropriate tools for judging the importance of regional research.

Current solution: A strive for higher coverage and its aftermaths

There is an awareness of the regional research coverage problems and there is an ongoing effort to include more regional journals into the major indexing services (Testa, 2011), but there are a few issues with that as well. Namely, as already mentioned, only a modest number of regional journals actually meets the top international indexing inclusion criteria (Testa, 2011). Furthermore, a too high inclusion of not-yet-deserving regional journals can potentially have negative consequences for the bibliometric status of their countries of origin. This can be illustrated by the effects of the inclusion of a large number of SEE journals from to Thompson Reuters WoS/JCR (Kosanović & Šipka, 2012). Specifically, this led to the coverage of multiple SEE countries becoming highly uneven and not corresponding well with the national research communities' potential (as measured by the Relative Citation Index), meaning that it resulted in the worsening of the countries' productivity-to-impact ratio. Kosanović and Šipka (2012) concluded that the overrepresentation of not-yet-deserving regional journals in the WoS/JCR is not in the best long-term interest of either 'awarded' countries or Thomson Reuters.

On a similar note, when elaborating on the citation-based evaluation of scientific research, Vessuri, Guédon, and Cetto (2014) recently made a powerful metaphor:

> Imagine a country deciding to improve the level of its citizens by promoting physical activities. Imagine further that only intense competition is used to achieve this goal: the process relentlessly selects (including promoting and financing) the best, but it leaves the overwhelming majority behind. Such a policy will undoubtedly improve a country's standing in the Olympics, but the general health level of the population will not significantly improve. In fact, it may even decrease because most people, quickly left out of the competitive process, would lose all incentive to exercise. (p. 649)

Vessuri et al. (2014) use this to illustrate how the current scientific evaluation (citation-based) competition regime might in fact lead to the worsening of the quality of research, especially in the "peripheral regions of the world" (p. 649). Using Latin America as an example, they point out that this "does not do much to enhance the general quality of research in the region, and it may even decrease it, even as the number of 'gold-medal' scientists may rise to some extent" (p. 649). Using Latin America as an example as well, Monjeau et al. (2013) describe how the systematic, citation-chasing strivings of the local ecology researchers shift their focus to globally more interesting theoretical environmental topics at the expense of regionally more relevant, practical issues. They argue that the impact factor rankings have damaged the region by "diverting researchers away from regional problems even as socioecosystems deteriorate around them" (Monjeau et al., 2013, p. 29).

The proposed solution: National or regional indexing and evaluation

We argue that the solution to the problem of quality evaluation of regional publishing lies in the advancement of regional journals' evaluation. While citation metrics are certainly not without problems and are susceptible to misuse (Garfield, 2005; Vessuri et al., 2014), they are arguably still the best tool we have (e.g. Hoeffel, 1998), and they are likely not going anywhere any time soon (Garfield, 2005). In the regional or national context, some of the described citation metrics issues can be dealt with simply by basing them on the regional or national data. In fact, the usefulness of national citation indexes/databases has been recognized by policy makers and research communities in many non-Western countries, such as China (Jin & Wang, 1999), Japan (Negishi, Sun, & Shigi, 2004), Russia (Mikhailov, 2013), India (Giri & Das, 2011), etc. Many moderately-sized or smaller countries such as Thailand (Sombatsompop et al., 2012) or Serbia (Šipka, 2005) also adopted the

same approach. In some cases, when individual countries are too small and/or their scientific production does not cover all of the major scientific fields, these indexes are either limited to certain fields only (e.g. Taiwan humanities citation index; Chen, 2004), or are elevated to a regional level. The example of the latter is Latin America, which has recently been grouped together with Spain, Portugal, the Caribbean, and South Africa in the regional SciELO Citation Index (Packer, 2014; see also Vessuri et al., 2014). Several of the mentioned indexes/databases are even recognized and promoted by big companies such as Thompson Reuters (see e.g., Thompson Reuters, 2014). They are viewed as add-ons to the top international services.

Note that, for obvious reasons, our focus is on our home region: Southeast Europe (SEE). Following the example of the (in many aspects comparable) region of Latin America and fortified by the multi-year experience with the Serbian Citation Index (Šipka, 2005), we propose that regional-level, rather than national-level evaluation and indexing would be the most appropriate approach for the SEE region, given its high level of administrative fragmentation and relatively small country sizes. This approach has the potential to solve several issues.Firstly, it would act as a quality improvement tool, which would allow regionally published journals to be compared to and to compete against similar journals, but without the negative consequences of a 'too high competition' outlined in the earlier Olympics metaphor (Vessuri et al., 2014), and without the 'too high pressure and stakes' (and the consequent productivity-to-impact ratio inflation) that can happen when a journal is elevated to international status too soon (see Kosanović & Šipka, 2012). This would also largely solve the coverage issues, as many more journals could be included in these 'middle tier' regional indexes than it could ever be possible with the highest tier indexes, such as WoS/JCR. Eventually, some of the best journals could smoothly transition to the highest tier services. Secondly, it would allow for a much more appropriate evaluation of impact, as citation metrics would be calculated based on regional data. This would take into account the regional relevance component that is (more or less) neglected when only international citation counts are considered. Thirdly, it would solve some of the 'small journals from small countries' problems outlined by Marušić and Marušić (1999), such as small author or reviewer pools, by allowing for a better networking of experts coming from similar cultural or language backgrounds.

Two major implications: Regional impact factor and indicators of bibliometric quality.

From a formal scientometric evaluation point of view, there are two major implications of the proposed approach. First, under this regional indexing and evaluation paradigm, as already mentioned, impact factors for regional journals should be calculated from regional citation data. The intention of these regional impact factors is not to fully replace global impacts, but rather to complement them by taking into account aspects that global impacts overlook. Second, as a goal of regional indexing is to improve formal journal quality and bring it closer to the international standards (Testa, 2012), additional measures should be used. Namely, we propose the so called indicators of bibliometric quality. Šipka (2012; see also Šipka et al., 2011) differentiates between the 'indicators of journal impact' based on the citation data, and the 'indicators of journal bibliometric quality'. The latter are mostly derived by quantifying the Thomson Reuters journal qualitative admission criteria (Testa, 2012) and comprise various measures such as the average (or median) age of the references, the share of the (inter)national references, journal-to-monograph reference ratio, etc. While the bibliometric quality measures are not particularly useful for reputable indexed journals, they have been demonstrated to be very practical tools for supporting the increase in quality of small, not yet established journals from small and developing countries (Šipka et al., 2011; Šipka, 2012). This is because the indicators of bibliometric quality are synergistically interrelated with the indicators of impact, and they serve as "a structural component of the journals' communication potential, and even something that can be treated as a necessary condition for small journals' international excellence, rather than merely 'the dress for success' or 'the suit that doesn't make the man'" (Šipka, 2012, p. 165-166).

Preconditions for idea implementation

As said above, our focus is on the SEE region. However, it is crucial to emphasize that the conceptualization of the SEE as a region is a highly sensitive issue, given its turbulent past, plagued by various conflicts and socioeconomic and political transitions (see Švob-Đokić, 2004). There are strong opinions that it is questionable as to whether the SEE can be viewed as a region, especially since "it is very strongly felt that the definition of the region is imposed from the outside" (Švob-

Đokić, 2001, p. 2). Similarly, others have suggested that it is not justifiable to treat the SEE as a cultural unit (Ballinger, 1999). We fully acknowledge these remarks. But, it has also been recognized that "this would not prove problematic if one recognized such categories as merely reflecting heuristic and/or historical boundaries" (Ballinger, 1999, para. 32). This is precisely the point of view that we have in mind when we consider the SEE as a somewhat interrelated scientific (publishing) space. It is merely a practicality, but one that has the potential to help scientific publishing endeavors of all the countries grouped under the tentative SEE boundaries. Furthermore, the complex historical heritage of SEE countries and related controversies might even be viewed as an additional reason for the SEE to be treated as a 'unified scientific publishing area' – as it opens a lot of research and dialogue topics that might be important to deal with, but might not necessarily be of big interest outside the SEE.

Following the described rationale, it was our decision to develop and introduce a regional SEE service that would act as a middle tier addition and coverage extension to major services such as WoS/JCR. Thus, the SEESAmE (SouthEast European Science Advanced through Evaluation; http://ceoncees.org/) system was conceived. SEESAmE is based on the described idea that regional citation data and the indicators of bibliometric quality should play a major role in the regional scientific publishing evaluation process. At the same time, in order to act as a promoter for SEE-published science, this system should behave not only as an evaluative tool, but also as a database, offering access to the publications that have been the subject of evaluation.

The goal of this paper is to check if there is a context and empirical ground for such a system. Thus, for the SEESAmE initiative to be justified, several questions need to be addressed (and several conditions need to be met):

[1] In order to assess the degree of necessity for regional indexing it should be determined what is the rough quantity/volume of scientific publishing in the SEE region by country and how much of it is actually covered by the major indexing services.

[2] If Southeast Europe could legitimately be viewed as a research area/entity, there should already be a substantial amount of scientific co-authorship among researchers from different countries comprising the SEE.

[3] If the journal evaluation process is to be based on regional citation data and the indicators of bibliometric quality, it should be determined how they relate to each other, and if they possess

some external predictive value. Furthermore, the regional impact factor should be demonstrated to add additional information/value to the existing global impact factor.

We conducted three separate studies in order to provide the answers to these broad questions.

Study 1: Number of the SEE journals and their indexing status

The aim of this descriptive study was to give a rough overview of the current number of journals from SEE countries/territories and to provide an overview of their coverage in major indexing services, such as WoS and Scopus.

Method

Journal titles for the analyses were taken from the SEE Journals Register (compiled internally by CEON/CEES before the beginning of this study, as a part of the SEESAmE project). In this register, journals were aggregated from several online sources, including library records, existing indexing services, and inductive online search. Apart from a verifiable ISSN or eISSN and self-declared scientific character confirmed indirectly through the source of origin, the only criterion for journal inclusion in the SEE Journals Register was the publisher's country. In addition, the Register (as well as SEESAmE) comprises journals published outside of the SEE region, but devoted to specific SEE topics. In classifying journals by country we did differentiate between journals from Serbia and Kosovo, the latter incorporating journals published by Serbian state-owned organizations situated in Kosovo. At the same time, due to some detection reliability issues, we did not separate the journals from North and South Cyprus, or from the two entities of Bosnia and Herzegovina ('Federation of Bosnia and Herzegovina' and 'Republic of Srpska'). These decisions were motivated solely by practical reasons.

Following the described procedure, we registered a total of 5340 SEE journals, and an additional 77 which were not from the SEE, but have SEE relevance. WoS and Scopus coverage for each journal was recorded. We are aware that the coverage is not exhaustive, but considering the inclusion criteria we find the journal list used in this study to be near to complete.

Results and discussion

Table 1 shows the 'raw' number of total journals from each SEE country/territory (from now on: country) and their (also 'raw') WoS and Scopus coverage. It is evident that 5/15 countries have no WoS journals, and 3/15 have no Scopus journals. Romania contributes to the region with the most journals in total, followed by Hungary, Turkey, Serbia, and Croatia. Turkey, Romania, Croatia, and Hungary have the highest number of WoS and Scopus journals. Further insight into the regional journal contributions is given in Figure 1. It shows the proportion of total journals from each individual country, which are indexed in WoS or Scopus. As it can be seen, Croatia has the highest proportion of its journals indexed in WoS (13%) and Scopus (34%), followed by Greece (10% and 29%), Slovenia (10% and 22%), and Turkey (8% and 22%). Notice that Romania, despite having the largest number of total journals in the SEE region (Table 1), has a much lower WoS/Scopus coverage (5% and 12%), falling into the middle range, with Hungary (5% and 14%) and Serbia (4% and 9%) (Figure 1).

Table 1. *Number of journals from South-East Europe (SEE) countries and WoS & Scopus coverage*

Countries	Total No. of Journals (% SEE)	WoS (% SEE)	Scopus (% SEE)
Albania	84 (1.6)	0 (0.0)	0 (0.0)
Bosnia and Herzegovina	202 (3.7)	1 (0.3)	11 (1.4)
Bulgaria	294(5.4)	14 (4.2)	55(6.2)
Croatia	404 (7.5)	54 (16.2)	139 (15.5)
Cyprus	55 (1.0)	0 (0.0)	2 (0.2)
Greece	237 (4.4)	24 (7.2)	68 (7.6)
Hungary	924 (17.1)	43 (12.9)	127 (14.2)
Kosovo	23 (0.4)	0 (0.0)	0 (0.0)
Macedonia	70 (1.3)	2 (0.6)	5 (0.6)
Moldova	85 (1.6)	0 (0.0)	4 (0.4)
Montenegro	28 (0.5)	0 (0.0)	0 (0.0)
Romania	1241 (22.9)	59 (17.7)	150 (16.8)
Serbia	604 (11.1)	23 (6.9)	56 (6.3)
Slovenia	254 (4.7)	26 (7.8)	56 (6.3)
Turkey	838 (15.5)	68 (20.4)	185 (20.7)
(Total)	5340	314	858
(Not from SEE, but SEE relevant journals)	77	19	36

Note: Numbers in parentheses represent country shares (%) of the total number of included SEE journals, excluding the "Not from SEE, but SEE relevant journals".

Taking into consideration that all these numbers are raw, i.e. not normalized, they should not be used as a basis for direct comparisons between countries. Ideally, this should be normalized by the number of researchers, science budgets, etc. However, as such data were not available (or reliable) for many of the SEE countries, we compromised with the two means of normalization that should be partially related to scientific outputs: gross domestic product (GDP) and the number of inhabitants.

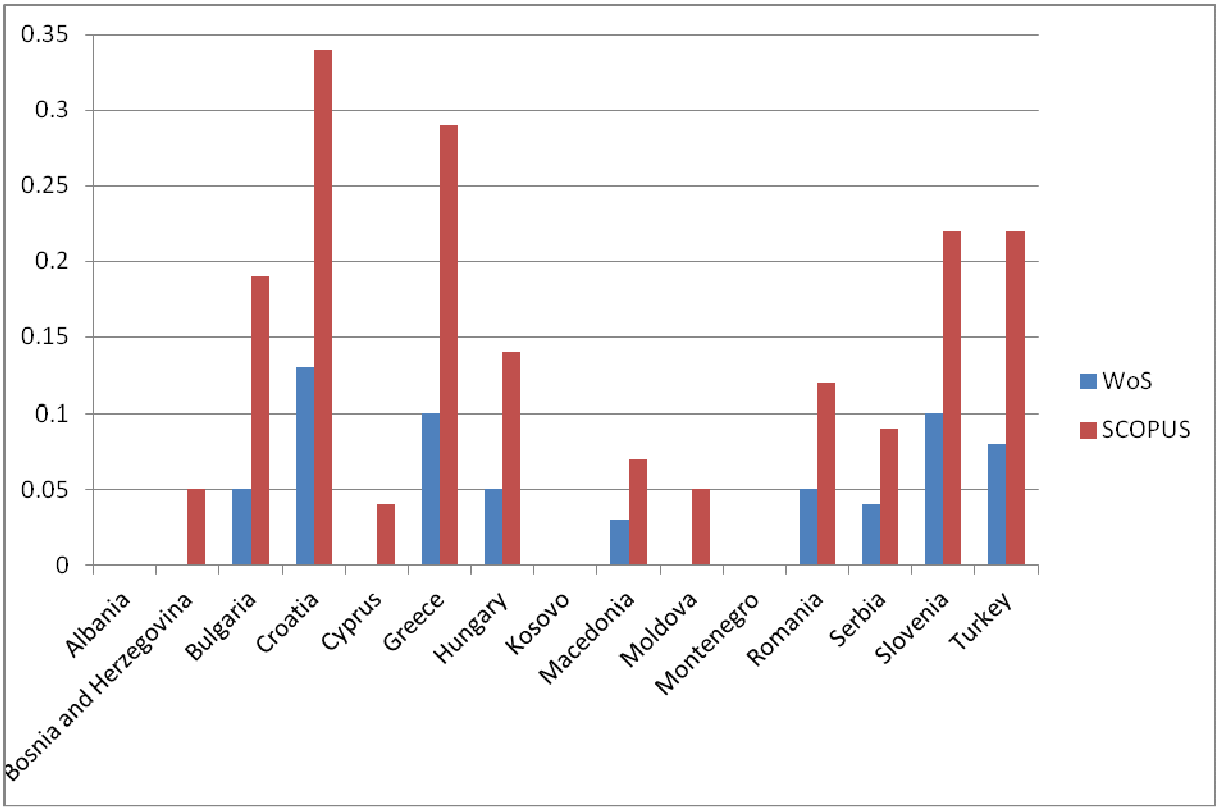

Figure 1. *A proportion of WoS and Scopus journals from the each country total number of journals.*

When normalized by GDP, the country ranks for the total number of journals, the number of WoS journals, and the number of Scopus journals changed only slightly, as compared to non-normalized values (ρ=.88 (p<.001), ρ=.97 (p<.001) for WoS, and ρ=.97 (p<.001) for Scopus, respectively), suggesting that the number of SEE countries' journals ranks are not highly affected by GDP. In contrast, when normalized by the number of inhabitants, several country ranks, especially those for the total number of journals, changed to a much higher degree, as shown in Table 2.

Table 2. *Ranks of journals from Southeast European (SEE) countries normalized by the number of inhabitants*

Countries	Raw No. of journal ranks (non-normalized)			No. of journals ranks normalized by the number of inhabitants		
	Total No. of Journals	WoS	Scopus	Total No. of Journals	WoS	Scopus
Albania	11	13	14	11	13	14
Bosnia and Herzegovina	9	10	9	6	10	8
Bulgaria	6	8	8	9	7	5
Croatia	5	3	3	2	1	1
Cyprus	13	13	12	7	13	11
Greece	8	6	5	13	6	7
Hungary	2	4	4	3	3	3
Kosovo	15	13	14	14	13	14
Macedonia	12	9	10	10	8	9
Moldova	10	13	11	12	13	12
Montenegro	14	13	14	8	13	14
Romania	1	2	2	5	5	6
Serbia	4	7	7	4	4	4
Slovenia	7	5	7	1	2	2
Turkey	3	1	1	15	9	10

Most notably, Romania, with raw numbers ranking for the total number of journals, the number of WoS journals, and the number of Scopus journals 1st, 2nd, and 2nd, dropped down to 5th, 5th, and 6th place after normalization. Turkey, with raw numbers ranking 3rd, 1st, and 1st, dropped to 15th, 9th, and 10th place. At the same time, Slovenia's ranks sharply improved, from 7th, 5th, and 7th, to 1st, 2nd, and 2nd, while Croatia took the region's lead, improving from 5th, 3rd and 3rd to 2nd, 1st, and 1st.

Conclusions of Study 1

When taken together, the presented data indicate that the number of journals per country is highly variable, but also that the 'raw' contributions of several bigger countries from the region (namely Romania and Turkey) expectedly tend to fall significantly when the number of inhabitants is accounted for. Still, all of this should be viewed as mere descriptions, with a specific goal of providing a preliminary insight into the volume of scientific journal publishing in the SEE region. However, this can be used to show that although a large number of journals exist in the region, their coverage in major international indexing services is modest, with less than 6% of total SEE journals

being included in WoS and 16% being included in Scopus, with some countries not having a single WoS/Scopus journal, and some having a high total number of journals, but disproportionately low WoS/Scopus coverage (e.g. Romania). This is consistent with our notion that a regional-level indexing mechanism could be useful, as the majority of scientific publishing in the region is obviously excluded from the 'gold standard' international indexing and ranking services. Furthermore, some seemingly 'high achievers', such as Turkey (and Romania when judging only by the total number of journals), in fact do not have that high of an indexing coverage and output when their needs, as estimated from the number of researchers or universities (here, from the number of inhabitants), are taken into account. Hence, they might profit from a regional indexing service as well.

Study 2: Co-authorship within SEE

The goal of this study was to determine co-authorship prevalence and patterns within the SEE, according to the existing WoS data.

Method

Using WoS advanced search, we applied a series of queries in order to determine the raw number of articles co-authored within and outside of the SEE. We used data from years 2011 and 2012 as a sample. Since Thompson Reuters (at the time of our data gathering) did not provide the possibility of searching for Kosovo as a separate country, we relied on the manual affiliations checks in order to differentiate it from Serbia. Also, there is no automated way of separating search results for North and South Cyprus, and the two Bosnia and Herzegovina entities. However, because of frequently unclear affiliations for these particular territories (especially for North and South Cyprus), the manual approach was deemed insufficiently precise, thus, analogous to Study 1, we opted not to separate the results for these territories (with the exception of the additional rough manual affiliation-based search for co-authorship between Serbia and Republic of Srpska – Bosnia and Herzegovina's entity – due to its high data interpretative relevance).

Results and discussion

The total number of articles, the number of articles published in SEE co-authorship, and the number of articles published in co-authorship outside the SEE are given in Table 3.

Turkey, Greece, Romania, Hungary, and Serbia have the highest raw number of WoS articles. Greece, Serbia, Hungary, Romania, and Turkey have the highest raw number of articles co-authored within the SEE. Greece, Turkey, Hungary, and Romania have the highest raw number of articles co-authored with international (non-SEE) authors. The number of total WoS articles is highly correlated with the number of SEE co-authored articles ($r=.92$, $p<.001$) and the amount of internationally (non-SEE) co-authored articles ($r=.97$, $p<.001$), suggesting that a higher total WoS output corresponds to a higher number of collaborations in general – within or outside of the SEE.

Table 3. *Total number of articles, SEE and outside of SEE co-authored articles (based on 2011-2012 WoS data)*

Countries	Total No. of articles	No. of SEE collab. articles	No. of non-SEE (international) collab. articles
Albania	529	74	116
Bosnia and Herzegovina	1377	491	153
Bulgaria	6037	804	1962
Croatia	9509	1277	2039
Cyprus	2418	688	687
Greece	30546	1949	9946
Hungary	16167	1583	6659
Kosovo	276	174	31
Macedonia	1123	250	199
Moldova	678	89	291
Montenegro	436	200	61
Romania	23459	1500	4253
Serbia	12933	1819	2288
Slovenia	9350	1268	2727
Turkey	62992	1493	9208

An insight into the collaboration patterns can be obtained by calculating the shares (%) of the SEE collaborations out of the total number of WoS outside collaborations (i.e. SEE and international collaborations for the observed country, excluding collaborations in which all co-authors come from the observed country). This is shown in Figure 2.

From the lowest 14% (Turkey) to the highest 85% (Kosovo), it is evident that the SEE is a significant outlet for foreign/outside scientific collaborations for authors from each of the SEE countries. Even in the absence of any kind of comparative data from other regions, this can probably be viewed as an indicator of substantial regional cooperation. It is also apparent that smaller countries rely on this

cooperation much more than the larger countries (there is a negative correlation between the share of SEE collaborations and the number of the country's inhabitants: ρ=-.79, p=.001).

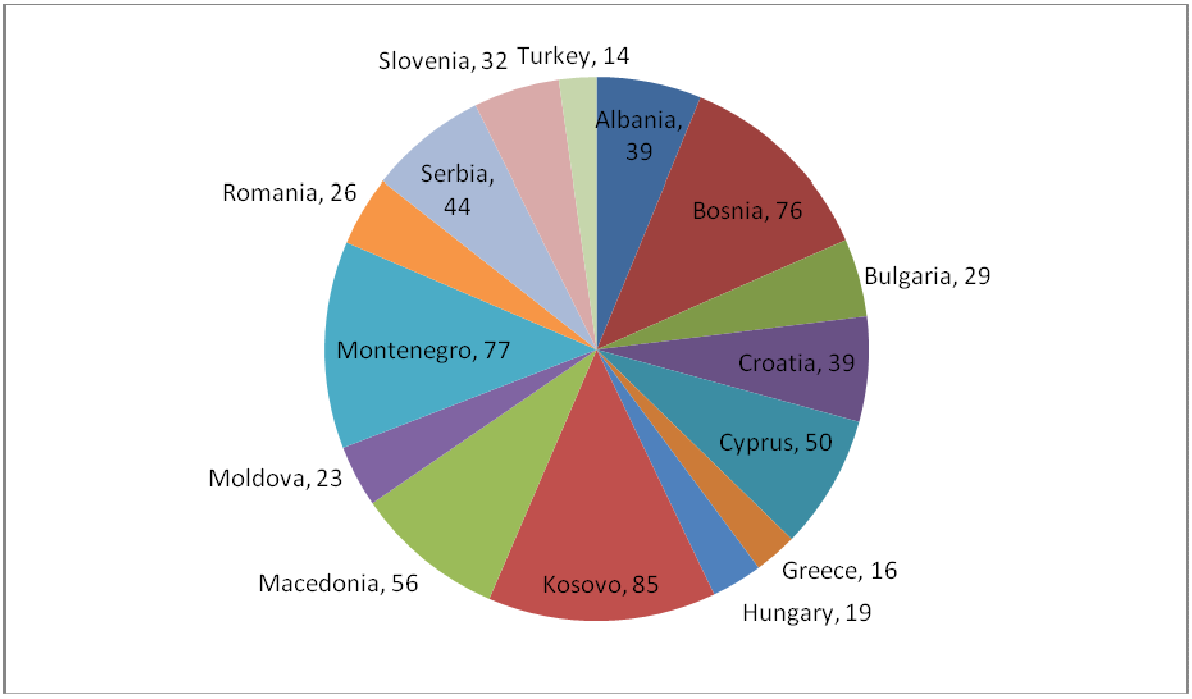

Figure 2. Shares (%) of SEE co-authored articles out of total WoS articles co-authored with authors outside of the country (i.e. SEE & international collaborations, excluding within country collaborations) based on 2011-2012 WoS data.

In other words, bigger countries from the region, which also publish the most WoS articles, despite having the highest total number of SEE collaborations, actually have the lowest shares (%) of SEE collaborations. In contrast, smaller countries, despite having a lower total output, publish very high percentages of their WoS articles in SEE co-authorship. Thus, smaller SEE countries heavily rely on regional scientific collaboration and they probably need it more than bigger SEE countries in order to advance their scientific output. As an additional illustration, it can be calculated that Kosovo, Montenegro, Bosnia and Herzegovina, Cyprus, and Macedonia publish (respectively) 63, 46, 36, 28, and 22 percent of their total WoS articles (both single-authored and co-authored) in SEE co-authorship. This is not to say that bigger SEE countries shy away from regional scientific collaborations within the SEE, but the smaller ones are clearly much more region dependent. This can also be seen from the two-mode SEE co-authorship diagram shown in Figure 3.

Notice, for example, the position of Turkey. The diagram reveals that within its SEE collaborations, Turkey has the most articles published together with authors from Greece (21%), Romania (17%), Hungary (15%), and Serbia (13%), which can be judged by the arrows going from Turkey's red circle to the above mentioned countries' blue squares (also, see Appendix A for a complete matrix and individual values). At the same time, authors from nine other countries publish 10% or more of their total SEE WoS collaboration articles with authors from Turkey (observe the arrows coming to Turkey's blue square from the corresponding countries' red circles). Thus, even though Turkey's relative share of SEE co-authorship is not too high (compared to other SEE countries), its high raw SEE collaboration output and the fact that authors from nine other SEE countries 'gravitate' towards authors from Turkey suggests that it could be viewed as a co-authorship 'big brother' for authors from the region. The same can be concluded for Greece, Hungary, and Romania, which all have high raw SEE co-authorship output, but lower relative SEE co-authorship shares. Still, according to Figure 3, authors from nine, eight, and seven other SEE countries co-publish 10% or more of their WoS articles with authors from Greece, Hungary, and Romania, respectively.

It is also evident from Figure 3 that Serbia is the country with the most widely spread co-authorship networks in the SEE region. Serbian authors co-publish noticeably high proportions of their WoS collaboration articles with six SEE countries (Greece, Hungary, Turkey, Slovenia, Romania, and Croatia), but most importantly, authors from 12 other SEE countries co-publish 10% or more of their WoS collaboration articles with author from Serbia. In fact, only authors from Albania and Moldova are not publishing 10% or more of their SEE co-authored WoS articles with authors from Serbia (i.e. they have co-authored 7% each). Furthermore, authors from three countries publish an especially high proportion of their SEE WoS articles in co-authorship with Serbian authors, namely those from Kosovo (64%), Bosnia (42%), and Montenegro (38%). All of the mentioned countries were once a part of the former Yugoslavia, together with Serbia. Kosovo and Serbia share a long and complicated history and political past, and Kosovo was a part of Serbia even after the Yugoslavia breakup. Similarly, Serbia and Montenegro were part of a political union less than a decade ago. When it comes to Serbia and Bosnia and Herzegovina, Serbia has especially strong cultural and historical ties with one of Bosnia's entities: Republic of Srpska. Using manual checking, we estimated that roughly 70% of Serbia's and Bosnia's co-authored WoS articles have at least one author from the Republic of Srpska territory. All in all, Serbia's historical, political, and cultural ties with the aforementioned countries evidently translate well into regional scientific collaborations, which then contributes to

Serbia's position as the biggest regional 'co-authorship receiver'. Similarly, but less pronounced, former Yugoslavia co-authorship trends can also be observed between Bosnia and Herzegovina, Croatia, and Slovenia. Note, however, that at least a part of the results regarding Serbia's collaborative position could be explained by simple geographical proximity, given that it borders with the highest number of other SEE countries (for more info regarding the spatiotemporal hypothesis in scientometrics see eg., Gao, Hu, Janowicz, & McKenzie, 2013).

Another curious case is that of Moldova and Romania. While Romania produces only 2% of its SEE co-authored WoS articles with Moldova, Moldova publishes 57% of its total SEE co-authored WoS articles with Romania, making this the strongest observed co-authorship (dependent) relationship after Kosovo and Serbia. And not unlike that example, Moldova and Romania also share a complicated history and sociopolitical relations, as well as the same language, and a border.

Strong co-authorship relations also exist between Cyprus, Greece, and Turkey. However, it is unclear at this time if North and South Cyprus relate to Greece and Turkey differently, which certainly is a possibility that should be explored further in subsequent studies.

Finally, authors from no other SEE country publish 10% or more of their WoS SEE collaborations with Albania, Bosnia and Herzegovina, Macedonia, Moldova, and Montenegro (notice that there are no lines going to their blue squares).

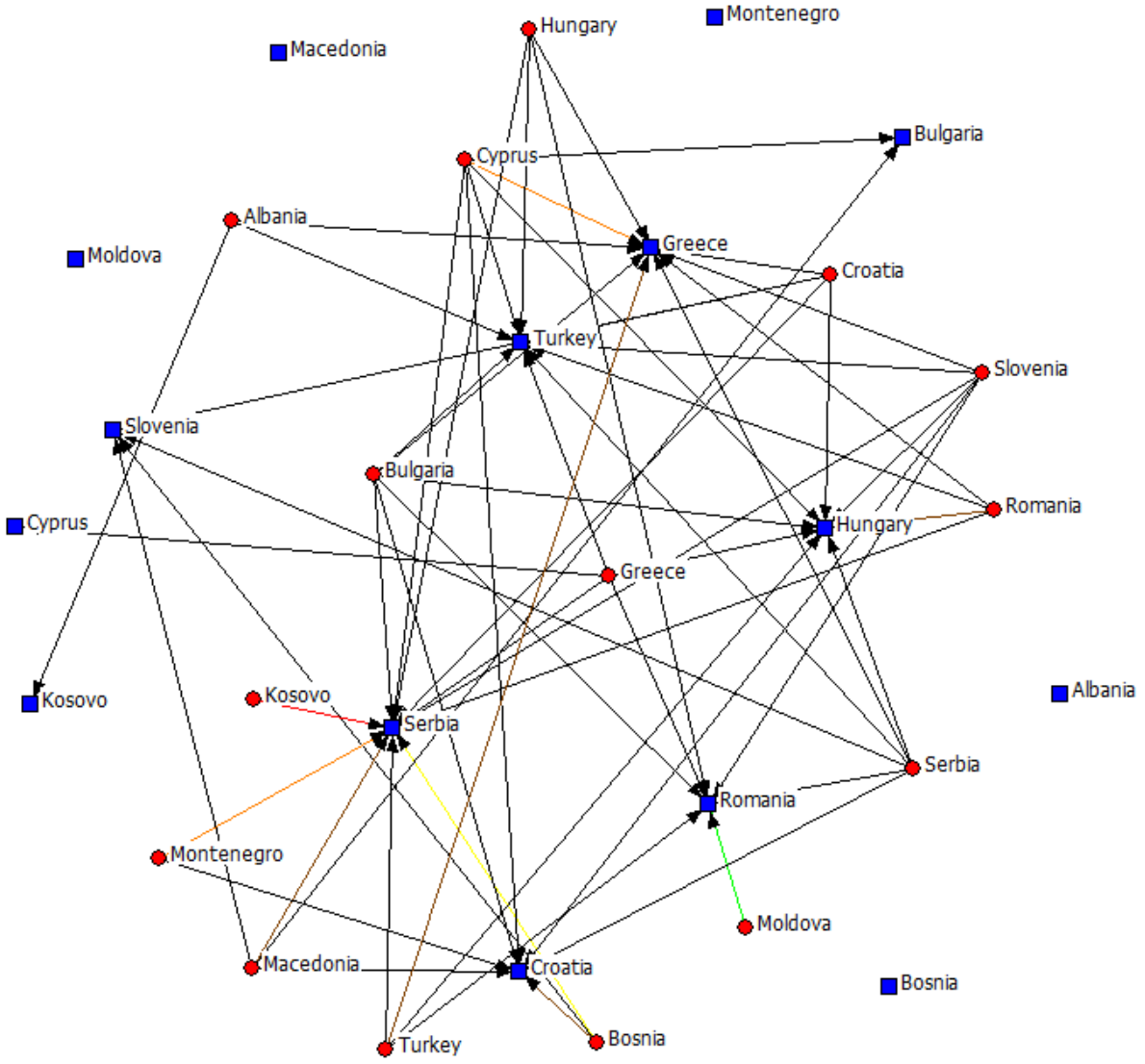

Figure 3. Two-mode diagram of the SEE WoS co-authorship. Each arrow represents a vector, with countries having both 'a sending end' (red circle) and 'a receiving end' (blue square) of the co-authorship vector. Values, represented by the arrows, are normalized in such a way to represent a proportion of the SEE WoS co-authorship that authors from a particular country are achieving with authors from other countries. Only the lines corresponding to 10% (i.e. .10) or higher percentage of co-authorship are shown, and the color corresponds with the strength of the relationship: .10 to .20 lines are black, .20 to .30 lines are brown, .30 to .40 lines are orange, .40 to .50 lines are yellow, .50 to .60 lines are green, and .60+ lines are red. For example, Bosnia and Herzegovina achieves 42% of its total SEE WoS collaborations with Serbia, represented by a yellow arrow going from Bosnia's red circle to Serbia's blue square. On the other hand, Serbia achieves less than 10% of its total SEE co-authorships with Bosnia and Herzegovina, as there is no arrow going from Serbia's red circle to Bosnia's blue square. A full matrix, containing all of the individual proportions is given in Appendix A.

Conclusions of Study 2

This study revealed several things. First, authors from all of the SEE countries, in fact, collaborate to a noticeable degree. Second, smaller countries publish especially large percentages of their WoS articles in SEE co-authorship. Third, bigger countries are less reliant on (but not excluded from) SEE collaborations, and they could be viewed as 'big brothers' to their smaller neighbors. Taken together, this is consistent with our starting premise that it is probably justified to conceptualize the SEE as an established scientific publishing/collaboration area.

Study 3: Bibliometric quality and regional impact

Following Šipka (2012), we wanted to test how various indicators of bibliometric quality (IBQ) are related to regional impact. Given the expectation that IBQs and the (regional) impact should be synergistically interrelated (Šipka, 2012), we would expect the IBQs of regional journals to be good predictors of the regional impact factor, i.e. impact derived from the regional citation data.

In addition, we were interested in determining how the global impact factor corresponds to the regional impact factor. Ideally, we would expect global and regional impacts to be positively correlated, but not too strongly, given that the idea behind the regional citation metrics is to measure complementary, but somewhat distinct planes of journal citation relevance. Furthermore, we would expect regional impact, global impact (i.e. WoS impact), and IBQs to be correlated to each other individually, but what their relationship would look like when observed simultaneously is not as clear. As IBQs are partially derived from the WoS/JCR inclusion criteria, journals having WoS impact should also have high IBQs. Thus, the question remains whether or not regional and global impacts would be related once IBQs are entered into the equation, or whether the potential relationship between regional and global impacts is fully explainable by the IBQs. In other words, we wanted to test if the relationship between regional and global impact is direct or indirect, i.e. mediated by the IBQs.

Finally, we were interested in testing if both the IBQs and the regional impact factor have some sort of external predictive validity. For example, we can go by the tentative assumption that better regional journals would be included into more reputable indexing services, arguably because such services are selective and probably capable of discerning better journals. Another way of looking at it is that better journals would aim to subscribe to better services, and would more actively seek admission (and work harder to meet the requirements) to reputable indexes. If either is true and if

IBQs and/or regional impacts are in fact valid tools as we expect them to be, they should have a predictive power for the indexing status of journals. Ideally, both the IBQs and the regional impact would provide independent contributions to such predictions.

Method

We conducted four major analyses (corresponding to the four presented problem questions), based on two different data sets. First, we regressed the selected indicators of IBQ on a (logarithmically transformed) measure of regional impact, specifically the five year regional impact factor (Reg. IF5). We conducted this analysis on a sample of Serbian journals (N=268, after excluding 18 outliers) included in the Serbian Citation Index (i.e. SCIndeks; Šipka, 2005). We selected this sample for practical reasons, as this was the only available sample of SEE journals that met the statistical assumptions, for which we had both reliable bibliometric and regional impact measures. The analysis was based on 2013 data. Šipka (2012) utilized six IBQs, which we extended by adding an indicator of articles' equipment. Thus, the following collection of IBQs was used:

[1] Equipment of articles – according to the international standards this includes: title, abstract and key words (KWs) in English, KWs based on a thesaurus, corresponding author's email, dates of reception and acceptance, grant acknowledgment, references in a separate section, standard citation style, and DOI.
[2] Share (%) of international authors – excluding articles co-authored with local authors.
[3] Share (%) of articles published in the English language.
[4] Number of references per article.
[5] Share (%) of journal references, i.e. 'Journal-to-monograph ratio' – including serials and annuals, excluding conference proceedings, official journals, newspapers and magazines.
[6] Share (%) of international references – published outside of the country/territory/region.
[7] Citing half-life, i.e. the average age of references – expressed by the average Median in years.

The second analysis was done on the initial SEESAmE Beta journal collection, which included a total of 194 journals from the SEE. These journals were collected semi-conveniently, which means that they were selected with the intention of making a roughly balanced representation of the five broadest research areas across SEE countries, which was possible only to a certain extent.

Consequently, certain journals were included simply as the only available ones. Thus, the sample of journals is not as large as we wished, nor fully representative, but it does allow for rough preliminary analysis. Based on this sample, we calculated correlations between the global impact measures, namely two year impact (WoS IF2) and five year impact (WoS IF5), and regional impacts, namely two year regional impact (Reg. IF2), and normalized two year regional impact (Reg. IF2-SNIP; calculated as a ratio of the journal IF2 and the expected (Mdn) IF in the journal's subject field). Untransformed variables and rank-correlations were used for this analysis.

The third analysis was also done on SEESAmE Beta journals. In order to assess if the regional and WoS impact factors are related directly, or if the effect between them is done through the IBQs, we used a mediation analysis (see e.g., Hayes, 2013; Zhao, Lynch, & Chen, 2010). Because many of the variables in this dataset were highly non-normally distributed and multiple journals were identified as statistical outliers (i.e. having no WoS impact factor), for data to be made appropriate for this particular analysis, several iterative logarithmic transformations and outlier eliminations had to be done. This resulted in the analysis being conducted on a subsample of 112 out of 194 SEESAmE Beta journals. We used the Reg. IF2-SNIP and two year WoS impact (WoS IF2), as these variables were the most suitable for distribution normalization. As for the IBQs, in order to increase the statistical power, we aggregated them into a single linear composite comprising 6 out of 7 selected variables (the 'Number of references per article' variable was omitted because it was not strongly correlated with the rest of the IBQs in this sample).

Finally, to test if the IBQs and the regional impact factor have some external validity, we used a variable showing the indexing status of SCIndeks journals. In the stage of data preprocessing, we looked at the coincidence of journals indexation by various services. Out of 16 different services, nine turned out to be significantly overlapping: Scopus, WoS, DOAJ, DOI, EBSCO, ProQuest, CAS ChemPort, CAB Abstracts, and MEDLINE. This allowed us to aggregate them into a more robust, composite variable of 'Journal indexing status'. Thus prepared, we conducted a hierarchical regression of seven IBQs (entered in the first step) and the regional impact (entered in the second step) on the journal indexing status variable.

Results and discussion

The results of the linear regression analysis having seven indicators of bibliometric quality as predictors and the five year regional impact factor as the criterion are given in Table 4. The model as a whole is statistically significant (p<.001), with R^2=.52, which means that 52% of the five year regional impact factor variance can be explained by the journals' bibliometric quality indicators. According to Cohen (1992), this would correspond to a large effect size.

Table 4 *Indicators of bibliometric quality (IBQs) as predictors of five year regional impact factor (Reg. IF5) (based on 2013 SCIndeks data)*

Variables	β	t	p
(Constant)	–	-1.76	<.001
Equipment of articles	-.03	-0.73	.469
Share (%) of international authors	.19	2.32	.021
Share (%) of articles published in the English language	.34	5.65	<.001
Number of references per article	.21	5.09	<.001
Journal-to-monograph ratio	.28	4.03	<.001
Share (%) of international references	-.10	-1.25	.214
Citing half-life	-.11	-2.30	.022

Notes: Betas (β) are standardized regression coefficients; t statistic is the coefficient divided by its standard error; p values represent statistical significance.

All but two indicators of bibliometric quality are significant predictors of regional impact, with a higher share of articles published in English, a higher ratio of journal (as compared to monograph) references, and a higher number of references per article being associated with the highest regional impact values. This is consistent with the findings of Šipka (2012), i.e. it is in line with the assumption that IBQs should be good predictors of regional impact.

Correlations between the global and regional impact factors are shown in Table 5. Consistent with our expectation, the two types of impact are positively correlated, but only in a low to modest degree, indicating that they are complementary, but still distinct measures of citation relevance. In other words, regional impacts do seem to contain unique information, not already included in the global impact measures.

A test of mediation between the Reg. IF2-SNIP and WoS IF2 through the composite variable of indicators of IBQ is shown in Figure 4. As it can be seen, all regression coefficients are positive and

significant, including both the direct (Reg. IF2-SNIP with WoS IF2) and indirect (Reg. IF2-SNIP with WoS IF2 through IBQ) path. This means that there is a partial mediation between Reg. IF2-SNIP and WoS IF2, as one part of this relationship is direct, but one part is done indirectly, through the IBQ.

Table 5 *Correlations of global and regional impact factors (based on SEESAmE Beta journal collection)*

Variables	WoS IF2	WoS IF5	Reg. IF2	Reg. IF2-SNIP
WoS IF2	1.00			
WoS IF5	.88	1.00		
Reg. IF2	.31	.29	1.00	
Reg. IF2-SNIP	.34	.31	.83	1.00

Notes: Values in the table are Tau-b rank-correlation coefficients and all are statistically significant at p<. 001 level; according to Cohen (1992), correlation values of .10, .30, and .50 are tentative cutoffs for a small, moderate, and large effect size, respectively; WoS IF2=Web of Science two year impact factor; WoS IF5=Web of Science five year impact factor; Reg. IF2=regional two year impact factor; Reg. IF2-SNIP=normalized two year regional impact factor.

The relative strength of the direct path is larger than the indirect path. In other words, the higher the regional impact, the higher the WoS impact should be, and this can only partly be explained by the fact that higher impact factor journals tend to have better values on indicators of bibliometric quality. Thus, both regional impact and indicators of bibliometric quality contain a part of the predictive value for the global/WoS impact.

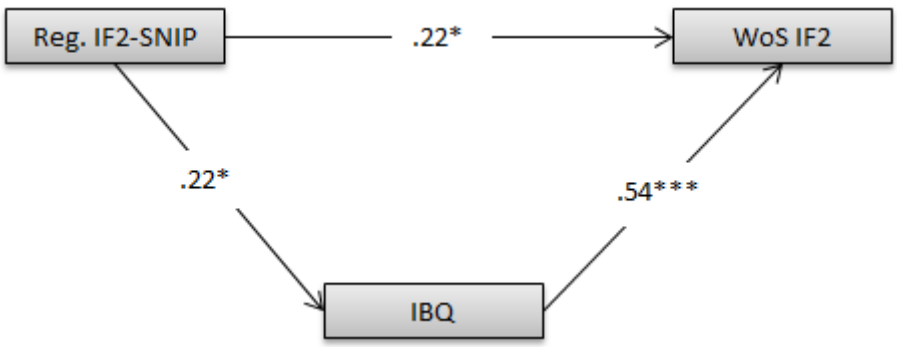

Figure 4. Standardized regression coefficients for the relationship between the normalized two year impact factor (Reg. IF2-SNIP) and Web of Science two year impact factor (WoS IF2) as mediated by indicators of the bibliometric quality composite variable (IBQ). Before IBQ is entered into the equation, the correlation between Reg. IF2-SNIP and WoS IF2 was .34, p<.001. Once IBQ was entered, the correlation between Reg. IF2-SNIP and WoS IF2 diminished to .22, but remained significant (p<.05), with an indirect path between Reg. IF2-SNIP and WoS IF2 through IBQ being: .12, 95% CI [.03, .23]. As bootstrapped 95% confidence interval (CI) does not contain zero, it can be concluded that the indirect path is also statistically significant. Notes: *p<.05, ***p<.001.

A hierarchical linear regression done to test if indicators of bibliometric quality and regional impact factor (Reg. IF5) predict the Journal indexing status is shown in Table 6. The analysis was done in two steps. In a first step (i.e. Model 1), IBQs were regressed on the Journal indexing status. Three IBQ variables (Share (%) of articles published in English, Number of references per article, and Share (%) of international references) turned out to be significant partial predictors, and Model 1 as a whole was statistically significant ($p<.001$), with $R_{Model\_12}=.34$, which means that 34% of the Journal indexing status variance can be explained by the journals' bibliometric quality indicators. According to Cohen (1992), this would correspond to a large effect size. In a second step (Model 2), the five year regional impact was also added as a predictor, together with IBQs. It also turned out to be a statistically significant predictor of the journal's indexing status, but with all the previously significant IBQs remaining significant. Model 2 improved the predictivity of Model 1 for another 3% (i.e. $R_{Model\_22}=.37$; $\Delta R2=.03$), and this change was statistically significant ($p<.001$).

Table 6. *Indicators of bibliometric quality (IBQ) and five year regional impact factor (Reg. IF5) as predictors of Journal indexing status (based on 2013 SCIndeks data)*

Model	Variables	β	t	p
1	(Constant)	–	-4.87	<.001
	Equipment of articles	.02	0.27	.789
	Share (%) of international authors	.01	0.07	.947
	Share (%) of articles published in the English language	.25	3.15	.002
	Number of references per article	.30	5.46	<.001
	Journal-to-monograph ratio	-.02	-0.24	.810
	Share (%) of international references	.24	2.46	.014
	Citing half-life	.04	0.71	.479
2	(Constant)	–	-3.81	<.001
	Equipment of articles	.03	0.42	.678
	Share (%) of international authors	-.05	-0.58	.562
	Share (%) of articles published in English language	.16	1.97	.049
	Number of references per article	.24	4.35	<.001
	Journal-to-monograph ratio	-.09	-1.22	.225
	Share (%) of international references	.27	2.79	.006
	Citing half-life	.07	1.22	.224
	Reg. IF5	.27	3.76	<.001

Notes: Betas (β) are standardized regression coefficients; t statistic is the coefficient divided by its standard error; p values represent statistical significance.

This points to a conclusion that both IBQs and regional impact uniquely and incrementally predict how well the journals are currently indexed.

Conclusions of Study 3

The results of this study confirmed our general expectations. Firstly, the indicators of bibliometric quality are good predictors of regional impact. Secondly, regional impact and WoS/JCR impact seem to measure related, but still different facets of the overall journal citation impact. Thirdly, the correlation between regional and WoS/JCR impact is both direct and indirect, with the latter manifesting itself through the indicators of bibliometric quality. This means that both regional impact and the indicators of bibliometric quality contain a part of the predictive value for the global impact. And fourthly, both the indicators of bibliometric quality and regional impact have external validity, as they uniquely and incrementally predict the existing indexing status of journals. Taken together, these findings are consistent with the starting notion that both regional impact and the indicators of bibliometric quality ought to be used as a complement to global citation metrics for regional journals' evaluation.

General Discussion and Conclusion

We began this paper by describing a practical problem – that of a delicate and unenviable position of regional research(ers) and journals, including insufficient journal indexing (Archambault et al., 2006; Kosanović & Šipka, 2012), language barriers and higher rejection rates for regional authors (Scolarone Thompson Reuters, 2012), resulting in the inadequate acknowledgment of regional research impact and value (Monjeau et al., 2013; ScolarOne Thompson Reuters, 2012). We approached this problem assuming that the majority of regional research/journals was of a generally lower (formal) quality (Marušić & Marušić, 1999; Matković et al., 2013, Testa, 2011) that could and should be improved.

However, following similar reasoning (e.g. Packer, 2014), we also assumed that the development policies of small nations' science (including regional, in our case SEE science) should aim at more than just including as many local journals as possible in the highest tier indexes such as WoS/JCR or Scopus. Opting for a more realistic approach, we conceived a platform for local journals' evaluation and promotion called SEESAmE. Its intended goal is to serve as a quality 'clearing house', the journals' 'springboard' to reach top-level international databases, a 'hotbed' for local authors' development, and an instrument to safeguard the quality of journals with no ambition to reach an international audience. In this paper, we presented some evidence to support the viability of this general idea.

Judging from the data presented in Study 1, it is clear that an extensive body of scientific literature exists in the SEE, but only a fraction of that is included in major services such as WoS and Scopus. Individual SEE countries participate in this body to a highly variable degree. Some (usually smaller) countries do not publish many journals and do not have any or almost any presence in WoS or Scopus. Some others publish a relatively modest number of journals, with a reasonably high

percentage of them being included in WoS/Scopus. Lastly, there are countries with numerous journals, with only a small portion of them indexed. This is not to say that WoS or Scopus should 'make room for more SEE journals', nor that more journals deserve to be included, but it does mean that a majority of scientific publishing output in the SEE is out of the sight of the global academic audience. This is also not to say that SEE research not covered by WoS or Scopus is totally invisible. A part of it is brought to light through international services such as Directory of Open Access Journals (DOAJ) or Central and Eastern European Online Library (C.E.E.O.L.) However, such systems have non-systematic coverage and, more importantly, lack both solid inclusion criteria and the tools for monitoring accepted journals. As a result, the justification for the inclusion of some journals is difficult to find, while the quality of the papers obviously varies to an enormous degree. This arguably puts good and less good (or even bad) science on the same visibility level, which increase the risks of quality publishing being mistaken for bad, by the effect of association. Thus, to 'separate the wheat from the chaff' and to 'ensure the wheat can grow', we argue in favor of the pairing of indexing services with the tools for supporting quality publishing, journal evaluation, and peer reviewer tracking.

At a general level, Study 1 results are consistent with our basic idea. There indeed is a need for building a middle tier regional indexing service, or 'a silver to WoS and Scopus gold'. A journal ranking system as a part of such a service gives a chance to small (and as we saw: quite numerous) journals to compete against their counterparts in a legitimate way (bibliometrically speaking). This would expectedly drive their quality up. Now many of them are 'protected' by language boundaries, within their national borders, although many do not need protection. A common regional evaluation platform can be of help to distinguish between regional journals of various goals (even if they happen to be indexed by top international databases) and to help them achieve these goals. For example, journals that do not see the world audience as their target group will have a better chance to expand their impact. The same can be claimed for the entire academic communities of larger and stronger SEE nations, although, as the results of Study 2 suggest, they gravitate more towards mainstream science than towards readers and users from surrounding national academic communities.

When it comes to the justification for treating the SEE as a distinct scientific region, Study 2 revealed that authors from every single observed country tend to co-publish within the bounds of the SEE to a

certain degree. For a little under half of the countries, that number is around half of the total of the country's collaborations. Obviously, there are no norms here and we have no similar data to contrast this against, but still, it is evident that the pattern of co-authorship exists, so we could tentatively conclude that this justifies the grouping of SEE countries under the same 'information umbrella'. Furthermore, while bigger countries do not seem to shy away from regional collaborations (but are not being limited to them), smaller countries do seem to rely on the within-SEE-co-authorship much more. The pattern of a 'bigger brother-smaller brother' relationship seems to be spreading beyond co-authorship.

Finally, as Study 3 revealed, the rationale that regional impact factors are useful complements to impact factors calculated on the global citation data is fully supported. Regional impact factors, in fact, do seem to tap into the aspect of regional relevance that global impact measurement overlooks. The two are positively related, but they do not fully overlap. Furthermore, consistent with our earlier findings and elaborations (Šipka et al., 2011; Šipka, 2012), indicators of bibliometric quality allow for a high statistical prediction of regional impact factor. The regional and global/WoS impact seems to be related in both a direct and an indirect fashion, with indicators of bibliometric quality serving as a partial mediator. Both regional impact and the indicators of bibliometric quality are useful when predicting the level of the global impact factor. In addition, both the indicators of bibliometric quality and regional impact are useful in the prediction of journals' indexing status. While none of this demonstrates the causality per se, it does confirm our starting assumption that the indicators of bibliometric quality and impact are in fact synergistically interrelated and, as such, a necessary condition for regional journals' international recognition (Šipka, 2012).

In conclusion, in this research, we found substantial support for the notion underlying the SEESAmE architecture. A need for a common platform for the monitoring and evaluation of journals published in the SEE may be considered confirmed. A methodology comprising indicators of not only international and regional impact, but also the measures of bibliometric quality seems to be productive. Along with an important aspect and integral part of the SEESAmE conception, the one related to quality control and enforcement (which is not considered here because it was taken for granted), the SEESAmE, or any other service of similar design, can indeed serve as a fulcrum of SEE research publishing in general.

Still, many questions remain. Some of them are related to the need for further clarification of relationships among evaluation indicators. Follow-up studies should preferably use much larger samples of journals and should cover more research disciplines. Also, more rigorous mapping of SEE publishing, preferably on the updated register of SEE journals, would be highly welcome. The perception of SEESAmE by researchers and reception by the journal publishers and editors ought to be surveyed. The potential role of SEESAmE within the SEE region in regard to the European research area should be highlighted. At last and most importantly, national regulatory and funding institutions have to say their word on SEESAmE as an initiative. Clear answers to these questions and issues, taken together, will decide if the SEESAmE project can come to life and stay that way.

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Apendix

The raw numbers (proportions) of co-authorships within the SEE (based on 2011-2012 WoS data)

Countries	Albania	Bosnia	Bulgaria	Croatia	Cyprus	Greece	Hungary	Kosovo	Macedonia	Moldova	Montenegro	Romania	Serbia	Slovenia	Turkey
Albania	–	.06	.09	.07	.01	.18	.02	.12	.06	.01	.04	.07	.07	.07	.13
Bosnia	.01	–	.02	.25	.00	.01	.02	.01	.03	.00	.02	.02	.42	.12	.06
Bulgaria	.01	.01	–	.12	.08	.17	.15	.00	.03	.00	.01	.12	.14	.03	.14
Croatia	.00	.06	.09	–	.07	.11	.13	.00	.02	.00	.01	.08	.16	.16	.10
Cyprus	.00	.00	.11	.11	–	.33	.13	.00	.00	.00	.00	.06	.10	.01	.16
Greece	.01	.00	.08	.07	.13	–	.16	.00	.01	.00	.00	.13	.14	.08	.18
Hungary	.00	.00	.09	.10	.06	.18	–	.00	.00	.00	.00	.18	.13	.09	.15
Kosovo	.08	.03	.02	.06	.00	.01	.01	–	.06	.00	.01	.01	.64	.02	.03
Macedonia	.02	.05	.13	.11	.00	.07	.04	.03	–	.01	.03	.06	.22	.12	.09
Moldova	.02	.03	.04	.05	.02	.04	.04	.00	.03	–	.03	.57	.07	.02	.06
Montenegro	.02	.04	.09	.11	.00	.08	.02	.01	.05	.01	–	.09	.38	.07	.02
Romania	.00	.00	.08	.06	.03	.17	.21	.00	.01	.02	.01	–	.14	.09	.19
Serbia	.00	.07	.08	.11	.04	.15	.13	.03	.02	.00	.02	.11	–	.12	.12
Slovenia	.00	.03	.02	.19	.01	.14	.14	.00	.02	.00	.01	.12	.19	–	.11
Turkey	.00	.01	.08	.08	.07	.21	.15	.00	.01	.00	.00	.17	.13	.07	–

Notes: Values in rows are normalized by dividing each row (i.e. raw number of co-authorships for a given country with other SEE countries) with a total number of corresponding SEE co-authorships, and then by a total sum of row values, so that each row adds up to 1.00. Using the first row, i.e. Albania as an example, values can be read as follows: within its total SEE collaborations, authors from Albania publish 6% of their articles with authors from Bosnia and Herzegovina, 9% with authors from Bulgaria, 7% with authors from Croatia, and so on.