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A BIBLIOMETRIC ANALYSIS OF PUBLIC BUSINESS SCHOOL SCIENTIFIC PRODUCTIVITY AND IMPACT IN SOUTH-EAST EUROPE (2017-2021)[1]

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Abstract

In this paper, we analyze the scientific productivity and impact of selected public business schools in South East Europe (SEE) in the 2017-2021 period by using the scientific output indexed in the Elsevier Scopus reference database. The region's most productive and influential authors, institutions, and publication outlets are identified in the field of business research. Empirical results are discussed from the viewpoints of two research questions related to regional business school research patterns and the research cooperation outcomes. Selected public business schools in the SEE region have been found to have a mixed record regarding research productivity and impact. International collaboration is valuable in increasing the research impact, while institutional collaboration seems more effective in raising impact than national one. Recommendations for business school administrators are identified and discussed.

Keywords: *Higher education, Business schools, Bibliometric analysis, Research cooperation, South East Europe*

JEL classification: *I23, O30*

1. Introduction

Since scientific research aims to produce new knowledge, its productivity is usually conceptualized in simple terms of scientific output, with an implicit expectation that it should be referred to in citation databases, such as Elsevier Scopus or Clarivate Web of Science (WoS). Such indexing enables quantitative measurement of publication impact and calculation of relevant indicators for research evaluation (Moed 2009). However, while the expectation of Scopus/WoS indexing could be directly applied to the STEM fields, it might not fully work for the arts, humanities, and social science fields (Abramo and D'Angelo 2014).

While productivity is often equalled to 'quantity' and impact to 'quality' of research, there is a clear distinction between research 'quality' and impact. While quality could be described in terms of *"the relative excellence of academic outputs intended for academic consumption"* (Donovan 2011, p. 176), the impact is

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defined by national research evaluation frameworks by *"the benefits that research outcomes produce for wider society"* (ibid). Its measurement is complex and could be viewed as contributing to solving 'real world' problems. However, this might conflict with the notion of academic autonomy of researchers and their institutions (Bornmann 2017).

In the UK, the impact is recognized by the value for external (non-academic) stakeholders. This opens another conflict in business school research - the tension between theoretical rigor and practical relevance (Philips, Sage, and Sebu 2020). While the 'ivory tower' metaphor can be raised as an argument for the perceived mismatch between the business school research and the business community knowledge requirements, the gap among the business school and the stakeholders' expectations also seems to depend on the adoption of an implied higher education model (Grotkowska, Wincenciak, and Gajderowicz 2015). Some studies (Aistrich, Saghafi, and Sciglimpaglia 2006) even show that such a mismatch might not be very high in countries with developed market economies, such as France, Germany, Netherlands, UK, etc.

On the other hand, the public higher education (HE) in the region of South East Europe (SEE) finds itself in a different context, which is often described in terms of the clientelistic and politicized public sector, serving the interests of the self-propelling political elites (Šimić Banović 2019; Pavlović 2022). This might drive the regional public business schools to continuously legitimize their role and activities toward the stakeholders, as previously empirically shown for the cases of primary and secondary education levels in Croatia (Vican, Alfirević, and Pavičić 2017; Alfirević, Vican, and Pavičić 2018). The described need for HE legitimization can often be found in a different context(s), where economic and social circumstances lead to high levels of youth unemployment (Simmons and Smith 2016), thus hinting at low performance and social contribution from higher education institutions (HEIs).

'Hard data,' such as bibliometric indicators verified by international citation providers, could be viewed as a preferred source of information related to HEI performance. We propose that the bibliometric approach might be especially applicable to social science HEIs and business schools, as their graduates might be less competitive and less inclined to participate in the global labor market. The practice of 'STEM colonization' supports such a proposition, i.e., the transformation of academic practices, especially research and publishing, in social sciences and humanities, toward the patterns from STEM and bio-medical fields (Brajdić Vuković, Vignjević Kotoraj, and Ćulum Ilić 2020).

Science evaluation systems in the SEE region and the broader neighborhood also increasingly focus on internationally indexed publications (Ciurak, Mijač, and Wierczyński 2021). These databases include the Elsevier Scopus and Clarivate Web of Science databases, which will be further discussed in the next section of this paper. The attractiveness of described trends for the SEE policymakers and academic experts wishing to demonstrate that social relevance and commitment to the modernization and reform agenda(s) can be best described by a quote from Živković and Panić (2020, p. 2319), who state that *"…a development model for WB* [Western Balkans] *countries has been proposed* [as related to development and measurement of science and higher education], *whereby they can acquire measurable competencies as a starting point for equal negotiations for their entry into the EU and gain a respectable position in the world".*

From the described perspective, quantitative bibliometric methods could indicate HE modernization and signal to stakeholders that the 'correct' management practices are being used. In the nonprofit sector, those have been recognized as a significant driver of how stakeholders assess organizational effectiveness (Herman and Renz 2004; Herman and Renz 2008), which might also apply to the academic sector. Some other business school practices, such as international accreditation efforts (Butt et al. 2021), could be classified in the same way, driving the stakeholders' perception of school performance.

Citation analysis, serving as a cornerstone for quantitative bibliometric methods, makes it easy to assess how the peer research community evaluates the primary scientific outputs, such as books, chapters, journal articles, etc. Measuring social impact is much less straightforward since there might not even be a consensus on the impact and which social stakeholders should be involved in receiving and evaluating research benefits (Aistrich, Saghafi, and Sciglimpaglia 2006).

Previous research (Siemens et al. 2005) shows that the public opinion and rankings of business schools, at least its undergraduate programs, depend highly on the research productivity scores. Although this study found a much weaker relationship between research productivity and graduate program rankings, Mitra and Golder (2008) later showed that research matters for MBA programs. In their study of 57 business schools, both positive short-term and long-term effects of the research performance have been observed over 18 years. These studies hint at the relationship between research productivity and business school performance. However, the regional HE context and the relationships of regional business schools

to its stakeholders (as explored by Pavičić, Alfirević, and Mihanović 2009) could have a significant impact on the nature of this relationship. This study should establish the baseline for such a research direction by offering the initial evaluation of the SEE region's productivity, impact, and cooperation patterns of business school research.

Due to such a framing of regional business schools' operations, there is a need for an initial study describing their research from the viewpoint of external stakeholders. Therefore, we examine the following research questions, formulated from the external stakeholders' perspective:

- RQ1. What are the patterns of scientific productivity and the impact of business school research in South East Europe?
- RQ2. What are the patterns of business school research cooperation and their outcomes?

While the approach used in this study has its limitations for a comprehensive research evaluation, it still serves the purpose of this paper, which aims to provide a preliminary overview of the regional public business schools' research performance.

Since an external stakeholder (such as a panel evaluating an EU-funded project proposal; management of a foreign HEI, evaluating cooperation opportunities; etc.) is likely to consult one of the popular bibliometric reporting tools, such as Clarivate InCites, or Elsevier SciVal, we opt to use bibliometric indicators without additional adjustments. An informed choice of bibliometric indicators can be used to assess different aspects of research performance (Waltman and van Eck 2015), and further (re)interpretation of results involves the development of a somewhat arbitrary procedure, considering different contextual factors.

However, in future analyses, in line with the recommendations of the Leiden manifesto (Hicks et al. 2015), additional qualitative evidence on regional business school research impact should be collected and assessed, along with the analysis of alignment between research results and organizational missions.

2. Literature review

Researchers in the field of business are often guided by performance measures, including bibliometric indicators, such as journal impact factors or journal lists, pointing out their relative excellence. In addition, survey-based ranking studies, national expert panels, and hybrid approaches are used to measure and evaluate the business school's scientific research (Hall and Page 2015).

With commercialization and competition increasingly becoming essential determinants of academic life, neoliberal solutions become the general panacea to be applied whenever an opportunity arises (Kleinman, Feinstein, and Downey 2013). This applies to academic research and publishing, as there is an increasing number of publishing outlets and the need to validate the research results by using the simplified and widely available metrics, easily comprehensible to a variety of potentially relevant stakeholders.

Description of challenges to evaluating regional public business schools' research fits a more comprehensive analysis of challenges faced by these HEIs (Rosi et al. 2018). They include pressure from the global education market, including non-traditional providers, such as schools, offering distance learning and e-learning degrees (Thomas and Cornuel 2012). In addition, regional business schools need to adjust to the complex administrative HE landscape(s) and address the social responsibility issues.

The most popular bibliometric indicators are journal citation counts, usually perceived as an acknowledgment of research relevance and interest raised by an article, or a journal, in the academic community (Garfield 1979). However, many researchers believe there is an inherent value of the research, as opposed to the number of citations received, which might vary due to a variety of reasons, including mere luck, the disproportional influence of the publication outlet's reputation, 'incorporation' of the research results into the field's common knowledge, citation of follow-up studies, the existence of 'citation cliques,' etc. (Aksnes and Rip 2009).

At the scientific journal level, it makes sense to calculate an indicator, demonstrating the citation performance of an average journal article over a predefined window of time. The journal impact factor (JIF), as defined by the influential Clarivate indexing service (producing the Web of Science reference database and the annual Journal Citation Reports), refers to the number of citations received by articles in a scientific journal during the previous two years, averaged by the number of 'citable' items, appearing in the journal (Garfield 1972; Garfield 2006). The 'citable' items are usually limited to original research articles and reviews, which Garfield considered drivers of scientific development and efficient communication. The main advantages of JIF were considered as correcting the potential influence of journal size (i.e., the number of citable items published) on the total number of citations received, as well as limiting the influence of 'classic' articles, receiving a considerable number of citations, which can be corrected by capturing those during a limited window of time (Bensman 2011).

Law and Leung (2019) indicated that the traditional JIF calculation methods have a range of weaknesses, including that 'uncitable' items are not included in the number of published articles, while citations are still counted. In addition, Clarivate does not publicly disclose the detailed procedures for WoS journal selection or defining a published journal item as 'uncitable,' which makes it impossible to reproduce the JIF calculation scores. These practices make the JIFs unreliable as journal quality or impact proxies, primarily because the two-year citation windows favor the STEM fields, where technological development is much more rapid than in social sciences and humanities.

Due to the differences in the number and dynamics of citations across scientific fields, there is a need to normalize citations (Podlubny 2005), according to the expected number of citations, depending on the field average. In the Elsevier Scopus ecosystem, such a bibliometric indicator is called Field-Weighted Citation Impact (FWCI). Its value is calculated by comparing the number of citations received with the average expected by the scientific field and the type of study (i.e., journal paper, review, book/book chapter, etc.). FWCI value of 1.0 is set as the global benchmark for the research impact, equal to the global value of the comparable research outputs, with values lower than 1.0 denoting a lower, and values higher than 1.0 – a higher level of research impact (Purkayastha et al. 2019).

However, the JIF metric is valuable only if accompanied by an opportunity to analyze the journal networks and the relationships among the participating journals. Such an initiative had existed since 1964 when the Institute of Scientific Information started covering the articles and references to the content of six hundred journals from the STEM fields and referring to the product as the Science Citation Index (SCI). The first systematic analysis of citation patterns for ISI-covered journals was performed in 1969, setting the grounds for the regular JIF calculation and creating the corresponding Journal Citation Reports (JCR) product. At the time of publication of the influential Garfield's (1972) article, its author contemplated a similar ranking scheme to be applied to the social science field, later leading to the establishment of the Social Science Citation Index (SSCI).

Web of Science (WoS) was born out of Eugene Garfield's idea of capturing only the most influential journals (Moed 2009). Even in the first JIF calculation exercise by ISI in 1969, Garfield (1972) has shown that a small group of 250 highly cited journals accounts for approximately half of all the processed references. His conviction that the core of scientific literature can represent the entire scientific production regardless of the scientific field (Garfield 1971/1977) led to the creation of a multi-disciplinary WoS reference database. Its philosophy still adheres to capturing the core literature and references. At the same time, another major citation database, Scopus, owned and developed by Elsevier BV since 2004, tries to achieve a more comprehensive selection of sources (journals, books, book chapters, etc.), especially in fields, underrepresented in WoS (e.g., social science and humanities) (Norris and Oppenheim 2017).

One of the most popular academic journals lists in the field of business research is the 'ABS Journal Guide,' produced by the UK Chartered Association of Business Schools (CABS), currently classifying 1,703 academic journals in the field by assigning grades of 1* (for journals of modest standard) to 5* (for journals of global distinction)[2]. Although CABS comments that its 'Journal Guide' should not be used as a universal guideline for deciding whether to publish (or not) in a particular outlet, as well as that researchers should consider a wide range of other factors in their publishing decisions[2], in practice, business school researchers tend to choose only journals from the higher ABS Journal Guide brackets. This might lead toward a 'research monoculture' and dominate the development of business scholarship (Mingers and Willmott 2013).

Still, the quantitative approach, based on the dominance of journal impact factors and journal excellence lists, could be preferred by the business school management since there might be a strong relationship between research productivity and international accreditation rankings (Hedrick et al. 2010; Ke, Lin and Sai 2016). Simultaneously, business school management feels pressure to comply with the international accreditation rankings, which are significant drivers of school reputation and produce additional income (Peters 2007).

3. Methods and data

To address the research questions RQ1 and RQ2, we use the Elsevier SciVal scientometric software to report and benchmark scientific productivity and impact. Based on a vast amount of Elsevier Scopus-referred research data, SciVal enables academic administrators and research managers to obtain institutional research profiles using various metrics[3]. Its additional modules can be used to benchmark with other academic entities, review the research trends at the level of individual researchers, research groups, academic institutions, and countries, and evaluate the existing and potential collaboration opportunities (Dresbeck 2015).

The conceptual arguments for the choice of the Elsevier SciVal bibliometric reporting tool have already been presented in the introduction section. Such a choice is aligned with the research intention to understand the regional public business school research output from the viewpoint of external stakeholders. It is also based on Elsevier Scopus data, which better covers the social science research outputs than WoS (Norris and Oppenheim 2017). From the methodological viewpoint, SciVal has recently been identified as a valuable tool for structuring broad literature reviews of entire scientific fields (Cucari et al. 2022).

In addition, SciVal is the reporting tool of choice when it comes to mapping the research output to the United Nations' SDGs, i.e., Sustainable Development Goals (Roberge, Kashnitsky and James 2022) according to the bibliometric queries and the machine learning algorithms (Bordignon 2021), developed by Elsevier and an academic consortium, headed by University of Southern Denmark, Vrije Universiteit Amsterdam and the University of Auckland.

The choice of bibliometric indicators used for benchmarking the scientific output of the public business schools in the SEE region is aligned with the previous studies in the field (Cucari et al. 2022). In analogy with the cited study of global CSR scholarly output and impact, and recommendations developed by Župič and Čater (2015), we follow the four steps of traditional bibliometric analysis:

1. Research design: determining the study aims and scope, including research questions.
2. Compilation of bibliometric data: selecting a referencing database and the supporting bibliometric analysis software solution, developing search criteria and filtering strategy.
3. Bibliometric analysis: data collection and export, data cleaning and import into the software tool of choice.
4. Interpretation of results (including optional visualization).

We captured the values of the selected metrics, following Cucari et al. (2022), automatically calculated by SciVal, based on the underlying Scopus data, available on 14. December 2022.

To adjust the selection of bibliometric indicators and entities (i.e., public business schools) involved in benchmarking, we consulted four anonymous experts from the Croatian academic community. Two were experts in the field of information science, actively engaged in the application of bibliometric methods and tools. Two were experts in academic research management, actively involved in research project development and implementation, and other applicative work at the level of individual schools or universities. An unstructured interview was conducted with each of the experts.

Information science experts were asked to evaluate the choice of bibliometric methods and tools to conduct a preliminary study of the field. They were also asked to recommend relevant bibliometric indicators for the benchmarking analysis. While the two experts confirmed the usefulness of the Elsevier Scopus and SciVal sources/tools, our initial choice of indicators proved somewhat biased. The final choice of indicators represents a balance between the initial views of the authors and the experts' recommendations.

Research management experts, who are knowledgeable in the reputation of the SEE region's public business schools, were asked to identify the broadest possible choice of institutions. The preliminary criteria for inclusion in this benchmarking effort included the following:

- International accreditation (a program or an institutional one): for that matter, lists of institutions accredited by AACSB and EFMD were consulted and discussed with experts;
- Preliminary insight into the research projects awarded to the institution: on this matter, we relied on the experts' information;
- Equal representation of all SEE countries: within each SEE country (Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, North Macedonia, Kosovo), we aimed to include at least one public business school in the empirical evaluation. In Bosnia and Herzegovina, we aimed to include business schools from both entities.

Based on the experts' advice and the previously described loose criteria, we chose the following academic entities – public business schools for comparison and benchmarking across the entire SEE region:

1. School of Economics and Business Ljubljana (University of Ljubljana, Slovenia),
2. Faculty of Economics and Business (University of Maribor, Slovenia),
3. Faculty of Management (University of Primorska, Slovenia),
4. Faculty of Economics and Business (University of Zagreb, Croatia),
5. Faculty of Economics and Business (University of Rijeka, Croatia),
6. Faculty of Economics, Business, and Tourism (University of Split, Croatia),
7. Faculty of Economics (Josip Juraj Strossmayer University of Osijek, Croatia),
8. Faculty of Economics (University of Banja Luka, RS – Bosnia and Herzegovina),

9. School of Economics and Business Sarajevo (University of Sarajevo, FB&H – Bosnia and Herzegovina),
10. Faculty of Economics Mostar (University of Mostar, FB&H - Bosnia and Herzegovina),
11. Faculty of Economics Mostar (University Džemal Bijedić Mostar, FB&H - Bosnia and Herzegovina),
12. Faculty of Economics Tuzla (University of Tuzla, FB&H - Bosnia and Herzegovina),
13. School of Economics and Business Belgrade (University of Belgrade, Serbia),
14. Faculty of Economics Subotica (University of Novi Sad, Serbia),
15. Faculty of Economics Podgorica (University of Montenegro, Montenegro),
16. Faculty of Economics Skopje (SS. Cyril and Methodius University Skopje, North Macedonia),
17. Faculty of Economics Prishtina (University of Prishtina "Hasan Prishtina" Kosovo).

Since this paper represents a preliminary analysis, a more comprehensive choice of business schools should be made in future research.

Another limitation of the bibliometric analysis is the correct identification of researcher affiliations in terms of parent (university) entities (Dimzov, Matosic and Urem 2021), as well as internal (school/faculty) affiliations. Only some of the business schools, which were analyzed by the Elsevier SciVal benchmarking module, have been included in the recommended Scopus internal affiliation hierarchies[4]. Identification of researchers is based on the broad SciVal thematic filter, identifying papers from the Economics and Business scientific field, as defined by the OECD FORD classification. This is a significant research limitation since the methodological approach entails that some publications might be missing or misclassified due to the broad classification of scientific fields and publications (Chudlarský and Dvořák 2020). Simultaneously, researchers from different schools, faculties, or departments within the same parent (university) affiliation might be included, or excluded from the analysis. However, until all internal classification hierarchies are correctly defined in Scopus, serving as the major source of bibliometric data for SciVal, there is no alternative solution for scientific output benchmarking.

Any additional adjustments, based on the relative size of the institution, available funding, or other factors, have not been performed for multiple reasons. Firstly, relative bibliometric indicators (in %) make it easy to perform comparison and benchmarking. Even th size-independent metrics have their limitations, which will be further discussed in the following section of the paper. Secondly, we have aimed to present the external viewpoint of the regional public business schools' scientific output, as potentially perceived by external funders and other significant stakeholders. This argument has been introduced and developed in the introduction section of the paper.

The entire period of five preceding years has already been used in similar bibliometric studies based on the argument of the average scientific project length (Körfgen et al. 2018). We adopt the previous recommendation and analyze the bibliometric output of regional business schools for the 2017-2021 period.

4. Results

The scientific output of the analyzed regional business schools is presented in Table 1, confirming the dominant role of schools located in regional capitals (Zagreb, Ljubljana, Belgrade). This is expected due to the number of affiliated researchers and resources available to the larger schools.

The number of citations, even in the early stage of a manuscript's life cycle, is a good proxy of the publication's ultimate impact (Wang, Song and Barabási 2013). Various approaches are related to including vs. excluding self-citations at different levels of science evaluation (Waltman 2016). We opted to exclude self-citations to avoid the potential researchers' self-promotion influence on the benchmarking results. In addition, we include the average number of citations per publication in the analysis to provide a size-independent indicator of scientific impact. This relative metric might be skewed by a small number or a single highly cited publication (Waltman 2016). Normalization of citations, due to the varying citing practices and patterns in different scientific fields (Waltman and Eck 2013), has not been performed since benchmarking is performed within a single social science field.

Table 2 presents the citation analysis results for the selected SEE business schools, which once again favors the larger business schools located in regional capitals, such as Ljubljana, Zagreb, and Belgrade. The trends seem to be compatible with those related to research output, except for an exceptionally high number of average citations, achieved by the business school at the SS Cyril and Methodius University in Skopje, North Macedonia (11.9), due to a single, highly cited article, published in the *Journal of Cleaner Production*[5].

Another interesting metric includes the number of the research entity's highly cited publications (related to a certain threshold[6]) to determine its impact among the peer institutions. We use the output in the top 1% and 5% citation percentiles for all

Table 1. The annual scholarly output of selected SEE business schools (2017-2021)

Entity	Scholarly Output					
	Overall	2017	2018	2019	2020	2021
University of Zagreb	**991**	183	189	193	185	241
University of Ljubljana	**871**	194	170	187	138	182
University of Belgrade	**571**	107	102	113	131	118
University of Novi Sad	**428**	93	82	88	96	69
University of Maribor	**422**	100	72	99	67	84
University of Split	**283**	38	54	51	52	88
University of Rijeka	**234**	40	47	46	42	59
University of Primorska	**209**	39	39	44	42	45
University of Montenegro	**202**	49	42	34	34	43
University of Sarajevo	**186**	43	19	33	50	41
SS Cyril and Methodius University in Skopje	**158**	63	23	24	23	25
University of Prishtina "Hasan Prishtina"	**130**	20	24	30	33	23
Josip Juraj Strossmayer University of Osijek	**93**	21	20	22	14	16
University of Banja Luka	63	14	15	12	11	11
University of Mostar	**28**	2	10	6	7	3
University of Tuzla	**27**	5	6	3	7	6
Dzemal Bijedic University of Mostar	**7**	2	1	0	1	3

Source: Elsevier SciVal, December 2022

Table 2. Citation analysis for the selected SEE business schools (2017-2021)

Entity	Citation Count (excl. self-citations)	Citations per Publication (excl. self-citations)
University of Ljubljana	8091	9.3
University of Zagreb	6457	6.5
University of Belgrade	4473	7.8
University of Novi Sad	2934	6.9
University of Split	2395	8.5
University of Maribor	2279	5.4
SS Cyril and Methodius University in Skopje	1878	11.9
University of Rijeka	1298	5.5
University of Primorska	1265	6.1
University of Sarajevo	1014	5.5
University of Montenegro	940	4.7
University of Prishtina "Hasan Prishtina"	561	4.3
Josip Juraj Strossmayer University of Osijek	493	5.3
University of Banja Luka	206	3.3
University of Mostar	104	3.7
University of Tuzla	98	3.6
Dzemal Bijedic University of Mostar	8	1.1

Source: Elsevier SciVal, December 2022

sources (publication outlets) and academic journals. Various other definitions for scientific excellence can be used in terms of citations. Bormann (2014) advises that most bibliometric studies use quantitative definitions, with one-quarter relying on percentile rank classes and the top 1% frequently used as an indicator of scientific excellence. When the total number of highly cited publications is considered (Table 3), the largest institutions stand out, although some smaller institutions are included, such as business schools at the University of Primorska (Slovenia), University of Novi Sad (Serbia), J. J. Strossmayer University of Osijek (Croatia), and University of Split (Croatia). Once again, a small number of highly cited papers can significantly influence the benchmarking results compared to a relatively smaller scholarly output.

At the individual level, some of the most influential papers[7] might be authored by researchers affiliated with the university to which a business school belongs, not the school itself. However, this is the limitation of the study, which is difficult to account for, unless the internal Scopus affiliation hierarchies are developed properly for all entities involved in benchmarking. Manual corrections might be possible, although such a procedure would make it impossible to use the SciVal tool and require direct access to raw Scopus data.

The number of highly cited publications should be compared to their proportion in the total scholarly output (as a size-independent metric), presented in Table 4. If the size-independent metric is adopted, business schools at the University of Primorska and JJ Strossmayer University of Osijek could be singled out as producing the highest quality scientific output in academic journals. However, they have three (Primorska)[8], i.e., only one paper (Osijek)[9] in the top 1% journal percentiles, as compared to eight (Ljubljana) and five (Zagreb). When considering the top 5% journal percentiles, it is difficult to benchmark with the largest regional public business schools in Ljubljana (85 publications) and Zagreb (78 publications). However, these results show that the three smaller public business schools in Koper, Osijek, and Novi Sad[10] have had solid scientific production in the previous five years and seem to represent strong contenders to the established and centrally located regional schools.

According to quartiles (Q1 to Q4), the classification of journals provides a simplified view of the journal and scholarly output research evaluation. The first

Table 3. Highly cited publications for selected SEE business schools (2017-2021)

Entity	Output in Top 1% Citation Percentiles (excl. self-citations)	Output in Top 5% Citation Percentiles (excl. self-citations)	Publications in Top 1% Journal Percentiles by CiteScore Percentile	Publications in Top 5% Journal Percentiles by CiteScore Percentile
University of Ljubljana	12	57	8	85
University of Zagreb	14	47	5	78
University of Primorska	1	7	3	13
University of Novi Sad	1	15	2	37
University of Belgrade	4	23	1	48
Josip Juraj Strossmayer University of Osijek	1	3	1	8
University of Split	6	19	0	28
SS Cyril and Methodius University in Skopje	3	6	0	4
University of Montenegro	1	5	0	5
University of Rijeka	1	8	0	10
University of Sarajevo	1	7	0	9
University of Maribor	0	16	0	28
Dzemal Bijedic University of Mostar	0	0	0	0
University of Banja Luka	0	0	0	1
University of Mostar	0	0	0	0
University of Prishtina "Hasan Prishtina"	0	1	0	3
University of Tuzla	0	0	0	0

Source: Elsevier SciVal, December 2022

Table 4. The proportion of highly cited publications (relative to scholarly output) for selected SEE business schools (2017-2021)

Entity	Output in Top 1% Citation Percentiles (excl. self-citations. %)	Output in Top 5% Citation Percentiles (excl. self-citations. %)	Publications in Top 1% Journal Percentiles by CiteScore Percentile (%)	Publications in Top 5% Journal Percentiles by CiteScore Percentile (%)
University of Primorska	0.5	3.3	1.6	7.1
Josip Juraj Strossmayer University of Osijek	1.1	3.2	1.5	11.9
University of Ljubljana	1.4	6.5	1.2	12.7
University of Zagreb	1.4	4.7	0.7	10.1
University of Novi Sad	0.2	3.5	0.5	9.7
University of Belgrade	0.7	4	0.2	10.4
Dzemal Bijedic University of Mostar	0	0	0	0
SS Cyril and Methodius University in Skopje	1.9	3.8	0	3.8
University of Banja Luka	0	0	0	2.8
University of Maribor	0	3.8	0	9.3
University of Montenegro	0.5	2.5	0	2.7
University of Mostar	0	0	0	0
University of Prishtina "Hasan Prishtina"	0	0.8	0	2.6
University of Rijeka	0.4	3.4	0	4.6
University of Sarajevo	0.5	3.8	0	6
University of Split	2.1	6.7	0	12.8
University of Tuzla	0	0	0	0

Source: Elsevier SciVal, December 2022

quartile (Q1) consists of the top 25% journals for a research field (area), as evaluated by a provider of bibliometric information, such as Clarivate (with its WoS and JCR products) or Elsevier (with its Scopus product)[11]. Subsequent quartiles (Q2 to Q4) consist of the journal classes, classified according to their impact, each comprising 25% of the remaining body of indexed scientific publications in the field. Therefore, the journal quartiles can be used as an alternative to the impact factor (JIF)-based metric. According to Miranda and Garcia-Carpintero (2019), the total share of Q1 publications is increasingly used for research evaluation and funding, while the amount of such publications varies according to the scientific field. In this paper, we aim to present the empirical results for the regional public business schools regarding the share of their publications in Q1-Q4 quartiles, regardless of the national science evaluation and academic promotion policies. Namely, these bibliometric indicators make it easy to perform an objective comparison of scientific excellence and compare it to the global benchmarks of scientific publication practice.

As expected, the distribution of papers, according to journal quartiles, is not proportional. Contrary to what might be considered 'logical,' top (Q1) journals publish more than 25% of documents, while Q3-Q4 journals publish less than that (Liu, Guo and Zuo 2018). Although higher-quartile journals are much more selective than lower-quartile ones, they attract the highest number of submissions since researchers tend to submit to the journals with the highest JIFs (Ibáñez, Bielza, and Larrañaga 2013).

For the sake of comparison to our results, based on Scopus data and the CiteScore metric (see Table 5), Miranda and Garcia-Carpintero (op. cit.) find the variability of as much as 25.4% to 85.6% of the scholarly output published in Q1 journals, as defined by the WoS Science Citation-Expanded index. Although the WoS SCI index tracks the STEM fields, it is interesting to note that the average share of Q1 documents is as high as 45.7% (i.e., 38.4% for journal articles and indexes only). Liu, Guo and Zuo (2018) obtained similar results for Q1 papers from the STEM field but also analyzed the social science papers indexed by the JCR-Social Sciences Edition (for 2016). The Q1 to Q4 publication shares in the WoS-indexed journals for the social sciences were 36%, 29%, 20%, and 15% (respectively).

Table 5. Publications in journal quartiles for selected SEE business schools (2017-2021)

Entity	Publications in Q1 Journals Quartile by CiteScore (%)	Publications in Q2 Journals Quartile by CiteScore (%)	Publications in Q3 Journals Quartile by CiteScore (%)	Publications in Q4 Journals Quartile by CiteScore (%)
University of Ljubljana	43	24.9	20.4	11.8
University of Belgrade	40.6	17.9	28.7	12.7
University of Novi Sad	33.5	25.1	29.3	12
University of Split	33	19.3	32.1	15.6
University of Zagreb	31.5	22.4	26.1	20
University of Maribor	30.7	27.7	25.3	16.3
University of Rijeka	29.4	22.9	33	14.7
University of Sarajevo	29.1	21.9	35.8	13.2
University of Montenegro	27.3	25.7	25.1	21.9
University of Primorska	25.1	23.5	27.9	23.5
Josip Juraj Strossmayer University of Osijek	22.4	17.9	32.8	26.9
SS Cyril and Methodius University in Skopje	20.2	28.8	28.8	22.1
University of Banja Luka	19.4	25	38.9	16.7
University of Tuzla	17.4	8.7	52.2	21.7
University of Prishtina "Hasan Prishtina"	12.2	33.9	34.8	19.1
University of Mostar	9.5	19	38.1	33.3
Dzemal Bijedic University of Mostar	0	33.3	16.7	50

Source: Elsevier SciVal, December 2022

Although we could not identify any Scopus-based bibliometric analyses of journal quartile publications in social sciences or economics, the presented findings could be used for an approximate comparison with our empirical results (Table 5). In this context, the top six analyzed schools, along with the business school at the University of Montenegro, seem to be doing well. We suggest that the research impact needs improvement once the share of Q1 publications is surpassed by either the share of Q3 or Q4 journal papers, which is the case for the ten entities in Table 5.

Collaboration proves to be a significant factor in research impact in many cases. It is generally expected that more intensive international collaboration should increase the number of citations (Katz and Hicks 1997). This has been empirically confirmed in different studies, especially for small developing countries, including Malaysia (Lowe et al. 2014), Vietnam (Nguyen, Ho-Le, and Le 2017), Brazil (McManus et al. 2020), etc. However, such a finding is not entirely generalizable, as its effect strongly depends on the scientific field (Glänzel and De Lange 2002). Pečlin et al. (2012) have confirmed this variability in the sample of Slovenian research groups' publications and suggested that researchers from small peripheral countries are motivated to collaborate to gain access to new resources. This could be the case with the research fields, which have not been developed enough, while international collaboration might not prove valuable for the already well-established fields.

Our results for the selected SEE business schools (see Table 6) are based on Elsevier SciVal data, identifying international, national, and institutional collaborations, as well as their impact, based on the citation normalization, to account for the multi-disciplinary research. The previously discussed Field-Weighted Citation Impact (FWCI) metric is used for this purpose, with values above 1.0, denoting the impact above the global average for Scopus-indexed publications.

International collaboration, in general, improves the research impact of the selected SEE business schools. However, a very high level of collaboration does not automatically translate into research performance, as demonstrated by several business school cases from Bosnia and Herzegovina. The best results are achieved by the public business school at the University of Split, followed by the two major public business schools in the region (Ljubljana and Zagreb).

Table 6. Collaboration patterns and impact for selected SEE business schools (2017-2021)

Entity	Int'l. Collab. (%)	Int'l. Collab. Impact	National Collab. (%)	National Collab. Impact	Institut. Collab. (%)	Institut. Collab. Impact
University of Split	32.5	18.5	18.4	4.3	36.8	5.3
University of Ljubljana	41.5	14.8	13.6	4.5	29.9	9.1
University of Zagreb	35.4	13.5	17.2	3.2	32.8	4.6
University of Novi Sad	34.6	12	25.5	5.2	36	7.1
University of Belgrade	37	11.9	19.8	7.2	30.7	7.7
University of Sarajevo	35	10.5	17.7	1.6	38.7	4.6
University of Maribor	37.9	9.9	20.1	4.4	33.2	3.8
University of Primorska	50.2	9.8	21.5	4.4	18.7	4.4
SS Cyril and Methodius University in Skopje	35.4	9.5	21.5	3.3	36.1	21.6
Josip Juraj Strossmayer University of Osijek	29	8.9	23.7	3.2	33.3	6.1
University of Montenegro	55.9	8.4	5	2.7	25.7	3.1
University of Rijeka	26.1	7.4	53	5.5	2.1	6.2
University of Prishtina "Hasan Prishtina"	46.9	6.8	18.5	2.4	23.1	4.4
University of Mostar	67.9	5.4	10.7	1	17.9	0.6
University of Banja Luka	49.2	3.7	25.4	1.6	17.5	5.4
University of Tuzla	29.6	3	48.2	5.6	18.5	1.2
Dzemal Bijedic University of Mostar	71.4	1.4	14.3	1	0	0

Source: Elsevier SciVal, December 2022

Table 7. Corporate collaboration patterns and impact for selected SEE business schools (2017-2021)

Entity	Academic-Corporate Collaboration (%)	Academic-Corporate Collaboration Impact
University of Ljubljana	1.6	18.7
University of Belgrade	1.2	12.3
University of Zagreb	1.9	5.9
University of Maribor	2.4	4.8
University of Rijeka	0.9	3.5
University of Sarajevo	2.2	2.5

Source: Elsevier SciVal, December 2022

Collaboration with the corporate entities (i.e., co-authors with corporate affiliations) is relatively modest (see Table 7 – only entities with existing corporate collaborations are listed; all others have no corporate collaboration, which could be identified in Scopus). Once again, FWCI assesses impact across the (potentially) multi-disciplinary collaboration. While the business schools achieve the most intensive corporate collaboration at the University of Sarajevo and Maribor, Ljubljana business school seems to have the most effective one.

5. Discussion

In this study, we aimed to provide an overview of the SEE public business schools' research landscape to inform further discussion and research on the potential influence of research productivity and impact on business school performance. Previous research has shown the linkages between the research productivity and impact and different metrics, describing business school performance in other higher education contexts. Some of those metrics were linked

to stakeholder perceptions (Mitra and Golder 2008), while successful stakeholder management proved to be one of the challenges to the Croatian institutions of higher education (Pavičić, Alfirević and Mihanović 2009). In addition, previous research (Sedlan König and Maškarin Ribarić 2019) on knowledge, skills, and attributes of university graduates relevant to employability hints at differing perspectives developed by the academic community and employers in Croatia. This finding also supports the notion of varying stakeholders' perceptions related to regional business school performance. The presented arguments provide a rationale for the theoretical and practical value of the research questions examined in this study.

In addition, bibliometric methods provide a helpful first step in informing the academic and professional communities, policymakers, researchers, and other business school stakeholders (Ellegaard and Wallin 2015). This justifies the choice of bibliometric analysis for an initial overview of the research arena and the consideration of further research directions.

Regarding RQ1, selected public business schools in the SEE region have a mixed record regarding research productivity and impact. The constant growth of the output seems to be a feature of some of the regional business schools, including the major business schools in Zagreb and Belgrade.

SEE business school research impact is assessed based on the analyses of citations and highly cited publications. Leading business schools in the regional capitals, including Ljubljana, Zagreb, and Belgrade, produced the most cited research output. There are several smaller, more peripherally located schools, contending strongly in this context, including schools located at the public universities in Novi Sad (Serbia), Split (Croatia), and Maribor (Slovenia), as related to the total number of citations (more than 2,000). When considering the highly cited publications, contenders to the major regional public business schools can be identified as business schools located at the public universities in Koper (Primorska – Slovenia), Osijek (Croatia), and Novi Sad (Serbia). When considering the publications in journal quartiles, the business school at the University of Montenegro also seems to meet the suggested criterion of the amount of Q1 publications surpassing the number of individual Q2-Q4 publications.

Regarding RQ2, international collaboration is valuable in increasing the research impact, while institutional collaboration seems more effective in raising impact than national one. It is unclear why this proves to be the case in almost all analyzed institutions and should be resolved by future research. The impact of different collaboration types could be singled out as this paper's most crucial empirical contribution, which still needs to be theoretically explained, with an additional analysis of the business school practices and their characteristics.

Some of the analyzed public business schools in the SEE region, such as the ones at the universities of Split (Croatia), Ljubljana (Slovenia), and Zagreb (Croatia), are especially effective in translating international collaboration into impact. However, this is not the case with business schools in Prishtina, Mostar, Banja Luka, and Tuzla, engaging in a significant international collaboration, but with lower effects, in terms of impact. Since the business schools in Split, Ljubljana, and Zagreb have invested heavily in international accreditation, the accreditation-related practices could serve as a variable, moderating or mediating the relationship between the research productivity (i.e., impact) and the overall assessment of business school performance.

Corporate collaboration patterns are relatively modest, with the business schools at the University of Ljubljana (Slovenia) and the University of Belgrade (Serbia) being the most effective. This hints that the corporate relationships, entrepreneurial aspirations of faculty, and the notion of the entrepreneurial university are much less significant as potential moderators or mediators of the observed relationship in the SEE region, as compared to the 'Western' higher education context (Gulbrandsen and Smeby 2005; Lowe and Gonzalez Brambila 2007; Abramo et al. 2012).

Different aspects of understanding the HEIs' research productivity and impact in the broader region, and recognizing the role of different factors, are to be further explored by future empirical research. The course of such research should not emphasize national scientific criteria and policies but instead rely on the criteria of global scientific excellence and the comprehensive impact metrics, as recommended by the Leiden manifesto (Hicks et al. 2015).

Based on the previous arguments, we believe that the practical value of this paper will be especially significant to the deans and management teams of the public regional business schools, who might be looking into strategies to strengthen the organizational research capacity, develop the relevant and valuable policies to support their researchers and enhance the stakeholder relationships.

Since this is one of the first published analyses of research productivity and impact of the SEE public business schools, its results should be treated as preliminary and informative for all actors involved in the region's economics and business higher education. There are significant limitations to the research results, including a more reliable identification of business

school researchers and papers (depending on the development of Scopus affiliation hierarchies), the inclusion of other regional business schools to benchmarking, as well as using the Clarivate Web of Science and InCites products as additional data sources.

6. Concluding remarks

In this paper, we analyzed the research productivity and impact of the SEE public business schools by using Elsevier Scopus and SciVal bibliometric tools. The empirical results open new theoretical questions, which the existing regional literature has not covered yet. At the same time, the practical implications could be significant to those schools' deans and management teams wishing to improve their research productivity and impact. Although the study has been a preliminary analysis based on using a standardized bibliometric reporting tool, it might also emphasize the external stakeholders' viewpoint on the legitimacy of regional public business schools.

Endnotes

1 This manuscript is based on an earlier version, which has been presented and discussed at the ICES 2022 conference at the School of Economics and Business at the University of Sarajevo.

2 See https://charteredabs.org/academic-journal-guide-2021/ (requiring free registration).

3 Authors are expressing gratitude to Elsevier BV and its Research Intelligence division for granting access to SciVal for research and non-commercial purposes.

4 See the tab 'Affiliation hierarchy,' available, e.g., for the University of Split (https://www.scopus.com/affil/profile.uri?afid=60006948) or the University of Zagreb (https://www.scopus.com/affil/profile.uri?afid=60008408). Affiliation details require licensed Scopus access, provided by the Ministry of Science and Education of the Republic of Croatia to the entire Croatian academic community.

5 Stojkoska, B. L. R., and Trivodaliev, K. V. 2017. A review of Internet of Things for smart home: Challenges and solutions. Journal of Cleaner Production 140: 1454-1464.

6 See Appendix I for Tables 2 and 3. The threshold is determined automatically by Elsevier SciVal from the latest available Scopus data.

7 See Appendix II for the list of papers and authors belonging to 1% of the top citation percentiles.

8 Pejic-Bach, M., Bertoncel, T., Meško, M., and Krstić, Ž. 2020. Text mining of industry 4.0 job advertisements. International Journal of Information Management 50: 416-431; Testa, F., Di Iorio, V., Cerri, J., and Pretner, G. 2021. Five shades of plastic in food: Which potentially circular packaging solutions are Italian consumers more sensitive to. Resources, Conservation and Recycling 173: 105726; Juvan, E., and Dolnicar, S. 2021. The excuses tourists use to justify environmentally unfriendly behaviours, Tourism Management, 83: 104253.

9 Zekić-Sušac, M., Mitrović, S., and Has, A. 2021. Machine learning based system for managing energy efficiency of public sector as an approach towards smart cities. International Journal of Information Management, 58: 102074.

10 This entity had two papers in the top 1% journal percentiles in the observed citation window: Pavluković, V., Armenski, T., and Alcántara-Pilar, J. M. 2017. Social impacts of music festivals: Does culture impact locals' attitude toward events in Serbia and Hungary?. Tourism Management 63: 42-53; Vujovic, S., Stanisavljevic, N., Fellner, J., Tosic, N., and Lederer, J. 2020. Biodegradable waste management in Serbia and its implication on P flows. Resources, Conservation and Recycling 161: 104978.

11 Elsevier does not provide a journal evaluation service, such as the Clarivate Journal Citation Rank (JCR) product. Based on Scopus data, journal and national ranks are provided by a Spanish research group, consisting of Consejo Superior de Investigaciones Científicas (CSIC), University of Granada, Extremadura, Carlos III (Madrid) and Alcalá de Henares. It is usually referred to as the SCImago (see: https://www.scimagojr.com/aboutus.php).

References

Abramo, G., D'Angelo, C. A., Ferretti, M., and Parmentola, A. 2012. An individual-level assessment of the relationship between spin-off activities and research performance in universities. R&D Management 42 (3): 225-242.

Abramo, G., and D'Angelo, C. A. 2014. How do you define and measure research productivity?. Scientometrics 101 (2): 1129-1144.

Aistrich, M., Saghafi, M. M., and Sciglimpaglia, D. 2006. Ivory tower or real world: do educators and practitioners see the same world? Marketing Education Review 16 (3): 73-80.

Aksnes, D. W., and Rip, A. 2009. Researchers' perceptions of citations. Research Policy 38 (6): 895-905.

Alfirević, N., Vican, D. and Pavičić, J. 2018. What Drives the Perception of School Principals as Professional Managers in Small European Countries? The Case of Croatia. Croatian Journal of Education 20 (4): 1299-1325.

Bensman, S. J. 2012. The impact factor: Its place in Garfield's thought, in science evaluation, and in library collection management. Scientometrics 92 (2): 263-275.

Bordignon, F. 2021. Dataset of search queries to map scientific publications to the UN Sustainable Development Goals. Data in Brief 34: 106731. (https://doi.org/10.1016/j.dib.2021.106731)

Bornmann, L. 2017. Measuring impact in research evaluations: a thorough discussion of methods for, effects of and problems with impact measurements. Higher Education 73 (5): 775-787.

Brajdić Vuković, M., Vignjević Korotaj, B., and Ćulum Ilić, B. 2020. STEM colonization: Applying hard sciences' socio-organisational patterns and evaluation procedures to the soft sciences in Croatia. European Journal of Education 55 (4): 542-559.

Butt, M. M., Huisman, J., Hussain, D., Alam, M., and Amin, M. 2021. Antecedents and consequences of students' attitudes towards internationally accredited business schools: a signalling theory perspective. Journal of Marketing for Higher Education. (https://doi.org/10.1080/08841241.2021.1942388)

Ciurak, P., Mijač, T. and Wierczyński, G. 2021. An overview of science evaluation in Poland and Croatia. Management – Journal of Contemporary Management Issues 26 (2): 229-244.

Chudlarský, T., and Dvořák, J. 2020. Can Crossref citations replace Web of Science for research evaluation? The share of open citations. Journal of Data and Information Science 5 (4): 35-42.

Cucari, N., Tutore, I., Montera, R., and Profita, S. 2022. A bibliometric performance analysis of publication productivity in the corporate social responsibility field: Outcomes of SciVal analytics. Corporate Social Responsibility and Environmental Management. (https://doi.org/10.1002/csr.2346)

Dimzov, S., Matošić, M., and Urem, I. 2021. University rankings and institutional affiliations: Role of academic librarians. The Journal of Academic Librarianship 47 (5): 102387. (https://doi.org/10.1016/j.acalib.2021.102387)

Donovan, C. 2011. State of the art in assessing research impact: introduction to a special issue. Research Evaluation 20 (3): 175-179.

Dresbeck, R. 2015. SciVal. Journal of the Medical Library Association: JMLA 103 (3): 164.

Ellegaard, O., and Wallin, J. A. 2015. The bibliometric analysis of scholarly production: How great is the impact?. Scientometrics 105: 1809-1831.

Garfield, E. 1971/1977. The Mystery of the Transposed Journal Lists - Wherein Bradford's Law of Scattering Is Generalized According to Garfield's Law of Concentration, Current Contents, 7 (5). Reprinted in Garfield, E. 1977. Essays of an Information Scientist, ISI Press.

Garfield, E. 1972. Citation analysis as a tool in journal evaluation: Journals can be ranked by frequency and impact of citations for science policy studies. Science 178 (4060): 471-479.

Garfield, E. 1979. Is citation analysis a legitimate evaluation tool? Scientometrics 1 (4): 359-375.

Garfield, E. 2006. The history and meaning of the journal impact factor. JAMA 295 (1), 90-93.

Glänzel, W., and de Lange, C. 2002. A distributional approach to multinationality measures of international scientific collaboration. Scientometrics 54 (1): 75–89.

Grotkowska, G., Wincenciak, L., and Gajderowicz, T. 2015. Ivory-tower or market-oriented enterprise: The role of higher education institutions in shaping graduate employability in the domain of science. Higher Education Research & Development 34 (5): 869-882.

Gulbrandsen, M., and Smeby, J. C. 2005. Industry funding and university professors' research performance. Research Policy 34 (6): 932-950.

Hall, C. M., and Page, S. J. 2015. Following the impact factor: Utilitarianism or academic compliance? Tourism Management 51: 309-312.

Hedrick, D. W., Henson, S. E., Krieg, J. M., and Wassell Jr, C. S. 2010. The effects of AACSB accreditation on faculty salaries and productivity. Journal of Education for Business 85 (5): 284-291.

Herman, R. D., and Renz, D. O. 2004. Doing things right: Effectiveness in local nonprofit organizations, a panel study. Public Administration Review 64 (6): 694-704.

Herman, R. D., and Renz, D. O. 2008. Advancing nonprofit organizational effectiveness research and theory: Nine theses. Nonprofit Management and Leadership 18 (4): 399-415.

Hicks, D., Wouters, P., Waltman, L., De Rijcke, S., and Rafols, I. 2015. Bibliometrics: the Leiden Manifesto for research metrics. Nature 520 (7548): 429-431.

Ibáñez, A., Bielza, C., and Larrañaga, P. 2013. Relationship among research collaboration, number of documents and number of citations: a case study in Spanish computer science production in 2000–2009. Scientometrics 95 (2): 689–716.

Katz, J., and Hicks, D. 1997. How much is a collaboration worth? A calibrated bibliometric model. Scientometrics, 40 (3): 541-554.

Ke, S. W., Lin, W. C., and Tsai, C. F. 2016. Research performance of AACSB accredited institutions in Taiwan: before versus after accreditation. SpringerPlus 5: 1285.

Kleinman, D. L., Feinstein, N. W., and Downey, G. 2013. Beyond commercialization: Science, higher education and the culture of neoliberalism. Science & Education 22 (10): 2385-2401.

König, Lj.S. and Maškarin Ribarić, H. 2019. Is there a mismatch between employers' and university teachers' perceptions on graduate employability in Croatia?. Management – Journal of Contemporary Management Issues 24 (1): 87-102.

Körfgen, A., Förster, K., Glatz, I., Maier, S., Becsi, B., Meyer, A., Kromp-Kolb, H. and Stötter, J. 2018. It's a Hit! Mapping Austrian research contributions to the sustainable development goals. Sustainability 10 (9): 3295. (https://doi.org/10.3390/su10093295)

Law, R., and Leung, D. 2020. Journal impact factor: A valid symbol of journal quality? Tourism Economics 26 (5): 734-742.

Liu, F., Guo, W., and Zuo, C. 2018. High impact factor journals have more publications than expected. Current Science 114 (5): 955–956.

Low, W. Y., Ng, K. H., Kabir, M. A., Koh, A. P., and Sinnasamy, J. 2014. Trend and impact of international collaboration in clinical medicine papers published in Malaysia. Scientometrics 98 (2): 1521-1533.

Lowe, R. A., and Gonzalez-Brambila, C. 2007. Faculty entrepreneurs and research productivity. The Journal of Technology Transfer 32: 173-194.

McManus, C., Baeta Neves, A. A., Maranhão, A. Q., Souza Filho, A. G., and Santana, J. M. 2020. International collaboration in Brazilian science: financing and impact. Scientometrics 125 (3): 2745-2772.

Mingers, J., and Willmott, H. 2013. Taylorizing business school research: On the 'one best way' performative effects of journal ranking lists. Human Relations 66 (8): 1051-1073.

Miranda, R., & Garcia-Carpintero, E. 2019. Comparison of the share of documents and citations from different quartile journals in 25 research areas. Scientometrics 121 (1): 479-501.

Mitra, D., and Golder, P. N. 2008. Does academic research help or hurt MBA programs?. Journal of Marketing 72 (5): 31-49.

Moed, H. F. 2009. New developments in the use of citation analysis in research evaluation. Archivum immunologiae et therapiae experimentalis 57 (1): 13-18.

Nguyen, T. V., Ho-Le, T. P., and Le, U. V. 2017. International collaboration in scientific research in Vietnam: an analysis of patterns and impact. Scientometrics 110 (2): 1035-1051.

Norris, M., and Oppenheim, C. 2007. Comparing alternatives to the Web of Science for coverage of the social sciences' literature. Journal of Informetrics 1 (2): 161-169.

Pavičić, J., Alfirević, N., and Mihanović, Z. 2009. Market orientation in managing relationships with multiple constituencies of Croatian higher education. Higher Education 57 (2): 191-207.

Pavlović, D. 2022. How to approach state capture in post-communist Europe. A new research agenda. Journal of Contemporary European Studies: 1-19. (https://doi.org/10.1080/14782804.2022.2106951)

Pečlin, S., Južnič, P., Blagus, R., Sajko, M. Č., and Stare, J. 2012. Effects of international collaboration and status of journal on impact of papers. Scientometrics 93 (3): 937-948.

Peters, K. 2007. Business school rankings: content and context. Journal of Management Development 26 (1): 49-53.

Phillips, P. A., Page, S and Sebu, J. 2020. Business and management research themes and impact [version 1; peer review: 1 approved, 1 not approved]. Emerald Open Research 2:67 (https://doi.org/10.35241/emeraldopenres.13987.1)

Podlubny, I. 2005. Comparison of scientific impact expressed by the number of citations in different fields of science. Scientometrics 64 (1): 95-99.

Purkayastha, A., Palmaro, E., Falk-Krzesinski, H.J., and Baas, J. 2019. Comparison of two article level, field-independent citation metrics: Field-Weighted Citation Impact (FWCI) and Relative Citation Ratio (RCR). Journal of Informetrics 13 (2): 635–642.

Roberge, G., Kashnitsky, Y., and James, C. 2022. Elsevier 2022 Sustainable Development Goals (SDG) Mapping. Mendeley Data, V1 (https://doi.org/10.17632/6bjy52jkm9.1)

Rosi, M., Tuček, D., Potočan, V., and Jurše, M. (2018). Market orientation of business schools: A development opportunity for the business model of university business schools in transition countries. Ekonomie+Management 21 (4): 175-194.

Siemens, J. C., Burton, S., Jensen, T., and Mendoza, N. A. 2005. An examination of the relationship between research productivity in prestigious business journals and popular press business school rankings. Journal of Business Research 58 (4): 467-476.

Simmons, R., and Smyth, J. 2016. Crisis of youth or youth in crisis? Education, employment and legitimation

crisis. International Journal of Lifelong Education 35 (2): 136-152.

Šimić Banović, R. 2019. Uhljeb–a post-socialist homo croaticus: a personification of the economy of favours in Croatia? Post-Communist Economies 31 (3): 279-300.

Thomas, H., & Cornuel, E. 2012. Business schools in transition? Issues of impact, legitimacy, capabilities and re-invention. Journal of Management Development 31 (4): 329-335.

Vican, D., Alfirević, N., and Pavičić, J. 2017. Challenges Facing the Educational System, School Effectiveness and School Principals in Croatia. In Conference Proceedings of the 8th International Scientific Conference "Future World by 2050", edited by D. Križman Pavlović, M. Paulišić M., and K. Kostelić, 11-29. Pula: Juraj Dobrila University of Pula – Faculty of Economics and Tourism "Dr. Mijo Mirković".

Waltman, L., and van Eck, N. J. 2013. Source normalized indicators of citation impact: An overview of different approaches and an empirical comparison. Scientometrics 96 (3): 699-716.

Waltman, L., & van Eck, N. J. 2015. Field-normalized citation impact indicators and the choice of an appropriate counting method. Journal of Informetrics 9 (4): 872-894.

Waltman, L. 2016. A review of the literature on citation impact indicators. Journal of Informetrics 10 (2): 365-391.

Wang, D., Song, C., and Barabási, A. L. 2013. Quantifying long-term scientific impact. Science 342 (6154): 127-132.

Živković, Ž., and Panić, M. 2020. Development of science and education in the Western Balkan countries: competitiveness with the EU. Scientometrics 124 (3): 2319-2339.

Župič, I., and Čater, T. 2015. Bibliometric methods in management and organization. Organizational Research Methods 18 (3): 429-472.

APPENDIX I.

Percentile thresholds for top cited papers (Tables 2 and 3)

	2017	2018	2019	2020	2021
Top 1%	129	111	87	69	35
Top 5%	51	44	36	27	14
Top 10%	32	28	23	17	9
Top 25%	14	13	10	8	4

Source: Elsevier SciVal, December 2022

APPENDIX II.

Papers and authors belonging to the 1% of the top citation percentiles (Economics and business field, 2017-2021)

1. Škare, M., Soriano, D. R., and Porada-Rochoń, M. 2021. Impact of COVID-19 on the travel and tourism industry. Technological Forecasting and Social Change 163.
2. Hellas, A., Ihantola, P., Petersen, A., Ajanovski, V. V., Gutica, M., Hynninen, T., Knutas, A., Leinonen, J., Messom, C., and Liao, S. N. 2018. Predicting academic performance: A systematic literature review. Annual Conference on Innovation and Technology in Computer Science Education ITiCSE, 175-199.
3. Karafiloski, E., and Mishev, A. 2017. Blockchain solutions for big data challenges: A literature review. 17th IEEE International Conference on Smart Technologies EUROCON 2017 - Conference Proceedings 763-768.
4. Risteska Stojkoska, B. L., and Trivodaliev, K.V. 2017. A review of Internet of Things for smart home: Challenges and solutions. Journal of Cleaner Production 140: 1454-1464,
5. Hosta, M., and Zabkar, V. 2021. Antecedents of Environmentally and Socially Responsible Sustainable Consumer Behavior. Journal of Business Ethics 171 (2): 273-293.
6. Kursan Milaković, I. 2021. Purchase experience during the COVID-19 pandemic and social cognitive theory: The relevance of consumer vulnerability, resilience, and adaptability for purchase satisfaction and repurchase. International Journal of Consumer Studies 456:1425-1442
7. Gërguri-Rashiti, S., Ramadani, V., Abazi-Alili, H., Dana, L. P., and Ratten, V, 2017. ICT, Innovation and Firm Performance: The Transition Economies Context. Thunderbird International Business Review 59 (1): 93-102
8. Hernaus, T., Cerne, M., Connelly, C., Poloski Vokic, N., and Skerlavaj, M. 2019. Evasive knowledge hiding in academia: when competitive individuals are asked to collaborate. Journal of Knowledge Management 23 (4): 597-618
9. Dabić, M., Maley, J., Dana, L.-P., Novak, I., Pellegrini, M. M., and Caputo, A. 2020. Pathways of SME internationalization: a bibliometric and systematic review. Small Business Economics 55 (3): 705-725
10. Connelly, C.E., Černe, M., Dysvik, A., and Škerlavaj, M. 2019. Understanding knowledge hiding in organizations. Journal of Organizational Behavior 40 (7): 779-782
11. Zekić-Sušac, M., Mitrović, S., Has, A. 2021. Machine learning based system for managing energy efficiency of public sector as an approach towards smart cities. International Journal of Information Management 58. (https://doi.org/10.1016/j.ijinfomgt.2020.102074)
12. Nižetić, S., Šolić, P., López-de-Ipiña González-de-Artaza, D., and Patrono, L. 2020. Internet of Things IoT: Opportunities, issues and challenges towards a smart and sustainable future. Journal of Cleaner Production 274. (https://doi.org/10.1016/j.jclepro.2020.122877)
13. Szymkowiak, A., Melović, B., Dabić, M., Jeganathan, K., and Kundi, G. S. 2021. Information technology and Gen Z: The role of teachers, the internet, and technology in the education of young people. Technology in Society 65. (https://doi.org/10.1016/j.techsoc.2021.101565)
14. D'Isanto, T., D'Elia, F., Raiola, G., and Altavilla, G. 2019. Assessment of sport performance: Theoretical aspects and practical indications. Sport Mont 171: 79-82
15. Delic, M., and Eyers, D. R. 2020. The effect of additive manufacturing adoption on supply chain flexibility and performance: An empirical analysis from the automotive industry. International Journal of Production Economics 228. (https://doi.org/10.1016/j.ijpe.2020.107689)
16. Reckien, D., Salvia, M., Heidrich, O., Church, J. M., Pietrapertosa, F., De Gregorio-Hurtado, S., D'Alonzo, V., Foley, A., Simoes, S. G., Krkoška Lorencová, E., Orru, H., Orru, K., Wejs, A., Flacke, J., Olazabal, M., Geneletti, D., Feliu, E., Vasilie, S., Nador, C., Krook-Riekkola, A., Matosović, M., Fokaides, P. A., Ioannou, B. I., Flamos, A., Spyridaki, N., Balzan, M., Fülöp, O., Paspaldzhiev, I., Grafakos, S., Dawson, R. 2018. How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28. Journal of Cleaner Production 191. (https://doi.org/10.1016/j.jclepro.2018.03.220)
17. Obradović, T., Vlačić, B., and Dabić, M. 2021. Open innovation in the manufacturing industry: A review and research agenda. Technovation 102. (https://doi.org/10.1016/j.technovation.2021.102221)
18. Caputo, A., Pizzi, S., Pellegrini, M. M., and Dabić, M. 2021. Digitalization and business models: Where are we going? A science map of the field. Journal of Business Research 123489-501. (https://doi.org/10.1016/j.jbusres.2020.09.053)
19. Ateljevic, I. 2020. Transforming the (tourism) world for good and (re)generating the potential 'new normal'. Tourism Geographies 22 (3): 467-475,
20. Radanović, I., and Likić, R. 2018. Opportunities for Use of Blockchain Technology in Medicine. Applied Health Economics and Health Policy 16 (5): 583-590.
21. Dabić, M., Vlačić, B., Paul, J., Dana, L. P., Sahasranamam, S., and Glinka, B. 2020. Immigrant entrepreneurship:

A review and research agenda. Journal of Business Research 113:25-38. (https://doi.org/10.1016/j.jbusres.2020.03.013)
22. Ichev, R., and Marinč, M. 2018. Stock prices and geographic proximity of information: Evidence from the Ebola outbreak. International Review of Financial Analysis 56: 153-166. (https://doi.org/10.1016/j.irfa.2017.12.004)
23. Ramadani, V., Abazi-Alili, H., Dana, L.-P., Rexhepi, G., and Ibraimi, S. 2017. The impact of knowledge spillovers and innovation on firm-performance: findings from the Balkans countries. International Entrepreneurship and Management Journal 13 (1): 299-325.
24. Pekovic, S., and Vogt, S. 2021. The fit between corporate social responsibility and corporate governance: the impact on a firm's financial performance. Review of Managerial Science 15 (4): 1095-1125.
25. Galant, A., and Cadez, S. 2017. Corporate social responsibility and financial performance relationship: A review of measurement approaches. Economic Research-Ekonomska Istrazivanja 30(1): 676-693.
26. Pejic-Bach, M., Bertoncel, T., Meško, M., and Krstić, Ž. 2020. Text mining of industry 4.0 job advertisements. International Journal of Information Management 50: 416-431. (https://doi.org/10.1016/j.ijinfomgt.2019.07.014)
27. Černe, M., Hernaus, T., Dysvik, A., and Škerlavaj. M. 2017. The role of multilevel synergistic interplay among team mastery climate, knowledge hiding, and job characteristics in stimulating innovative work behavior. Human Resource Management Journal 27 (2): 281-299.
28. Avancini, D. B., Rodrigues, J. J. P. C., Martins, S. G. B., Rabelo, R. A. L., Al-Muhtadi, J., and Solic, P. 2019. Energy meters evolution in smart grids: A review. Journal of Cleaner Production 217: 702-715. (https://doi.org/10.1016/j.jclepro.2019.01.229)
29. Škare, M., and Soriano, D. R. 2021. A dynamic panel study on digitalization and firm's agility: What drives agility in advanced economies 2009–2018. Technological Forecasting and Social Change 163. (https://doi.org/10.1016/j.techfore.2020.120418)
30. Kunaver, M., and Požrl, T. 2017. Diversity in recommender systems – A survey. Knowledge-Based Systems 123: 154-162.
31. Rodič, B. 2017. Industry 4.0 and the New Simulation Modelling Paradigm. Organizacija 50 (3): 193-207.
32. Markovic, S., Koporcic, N., Arslanagic-Kalajdzic, M., Kadic-Maglajic, S., Bagherzadeh, M., and Islam, N. 2021. Business-to-business open innovation: COVID-19 lessons for small and medium-sized enterprises from emerging markets. Technological Forecasting and Social Change 170. (https://doi.org/10.1016/j.techfore.2021.120883)
33. Fakhar Manesh, M., Pellegrini, M. M., Marzi, G., and Dabic, M. 2021. Knowledge Management in the Fourth Industrial Revolution: Mapping the Literature and Scoping Future Avenues. IEEE Transactions on Engineering Management 68 (1): 289-300.
34. Škerlavaj, M., Connelly, C.E., Cerne, M., and Dysvik, A. 2018. Tell me if you can: time pressure, prosocial motivation, perspective taking, and knowledge hiding. Journal of Knowledge Management 22 (7): 1489-1509.
35. Dagar, V., Khan, M.K., Alvarado, R., Usman, M., Zakari, A., Rehman, A., Murshed, M., and Tillaguango, B. 2021. Variations in technical efficiency of farmers with distinct land size across agro-climatic zones: Evidence from India. Journal of Cleaner Production 315. (https://doi.org/10.1016/j.jclepro.2021.128109)
36. Cadez, S., Czerny, A., and Letmathe, P. 2019. Stakeholder pressures and corporate climate change mitigation strategies. Business Strategy and the Environment 28 (1): 1-14.
37. Gill, S. S., Tuli, S., Xu, M., Singh, I., Singh, K. V., Lindsay, D., Tuli, S., Smirnova, D., Singh, M., Jain, U., Pervaiz, H., Sehgal, B., Kaila, S. S., Misra, S., Aslanpour, M. S., Mehta, H., Stankovski, V., and Garraghan, P. 2019. Transformative effects of IoT, Blockchain and Artificial Intelligence on cloud computing: Evolution, vision, trends and open challenges. Internet of Things 8: 100118. (https://doi.org/10.1016/j.iot.2019.100118)
38. Farmaki, A., Miguel, C., Drotarova, M. H., Aleksić, A., Čeh Časni, A., and Efthymiadou, F. 2020. Impacts of Covid-19 on peer-to-peer accommodation platforms: Host perceptions and responses. International Journal of Hospitality Management 91: 102663. (https://doi.org/10.1016/j.ijhm.2020.102663)
39. Bogilović, S., Černe, M., and Škerlavaj, M. 2017. Hiding behind a mask? Cultural intelligence, knowledge hiding, and individual and team creativity. European Journal of Work and Organizational Psychology 26 (5): 710-723.
40. Vlačić, B., Corbo, L., Costa e Silva, S., and Dabić, M. 2021. The evolving role of artificial intelligence in marketing: A review and research agenda. Journal of Business Research 128: 187-203. (https://doi.org/10.1016/j.jbusres.2021.01.055)
41. Nižetić, S., Djilali, N., Papadopoulos, A., and Rodrigues, J. J. P. C. 2019. Smart technologies for promotion of energy efficiency, utilization of sustainable resources and waste management. Journal of Cleaner Production 231: 565-591. (https://doi.org/10.1016/j.jclepro.2019.04.397)
42. Baleta, J., Mikulčić, H., Klemeš, J. J., Urbaniec, K., and Duić, N. 2019. Integration of energy, water and environmental systems for a sustainable development. Journal of Cleaner Production 215: 1424-1436. (https://doi.org/10.1016/j.jclepro.2019.01.035)
43. Runko Luttenberger, L. 2020. Waste management challenges in transition to circular economy – Case of Croatia. Journal of Cleaner Production 256. (https://doi.org/10.1016/j.jclepro.2020.120495)

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