Sustainable Development Education Research in South East Europe, 2016–2022: A Bibliometric Study

Nikša Alfirević[1(✉)], Maja Arslanagić-Kalajdžić[2], and Vlatka Škokić[1]

[1] Faculty of Economics, Business and Tourism, University of Split, Cvite Fiskovića 5, 21000 Split, Croatia
{nalf,vlatka.skokic}@efst.hr

[2] School of Economics and Business, University of Sarajevo, Trg Oslobodenja-Alija Izetbegovic 1, 71000 Sarajevo, Bosnia and Herzegovina
maja.arslanagic@efsa.unsa.ba

Abstract. Sustainable development has become an essential part of responsible education, regardless of its level or the professional field. As part of the 'third mission' of higher education institutions (HEIs), sustainable development education should be accompanied by the relevant research, dissemination, and outreach toward the communities, civil society organizations, and governments. This study focuses on sustainable development education research in South East Europe (SEE). We analyze the extant SEE academic literature on sustainable development education using a popular bibliometric tool (Elsevier SciVal). We identify the implications of the obtained results for the educational practice and higher education policies in sustainable development and discuss the potential contribution of research to the sustainable development education and dissemination/outreach practices of HEIs in SEE.

Keywords: Sustainable development education · Bibliometric benchmarking · South East Europe

1 Introduction

Becoming sustainable is no longer just a phrase that individuals and organizations use without understanding its meaning – it has become an immanent liability that every individual and organization carries with itself to ensure the future of humankind. Driven by the United Nations' Sustainable Development Goals (SDGs), which represent a *"universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030"* [1], many actions coincide for the world to develop more sustainably.

Higher education is not an exemption. Covered with *Goal 4: Quality Education*, sustainability is higher education institutions' (HEIs') third or even fourth mission [2] on the path of development. HEIs usually cover various disciplines, and each addresses the problem differently. E.g., while sustainability can be an integral aspect of curriculum

T. Tufek-Memišević et al. (Eds.): ICSD 2022, LNNS 529, pp. 58–68, 2023.
https://doi.org/10.1007/978-3-031-17767-5_5

and actions at a department focused on science, it can be an additional topic in teaching, requested from an external quality assurance agency at a business school.. However, sustainability orientation is signaled through curricula and programs offered and through institutional actions and behavior in the public space.

This study focuses on sustainable development education research, defined as *"the educational culture that enables individuals to reflect through multicultural, global and future-oriented perspectives, on their responsibility for the complex effects of decision-making and behavior"* [3]. The main aim is to understand the research developments in this area by analyzing the extant literature. We rely on the reviews done in the past, such as the one from Hallinger and Chatpinyakoop [4]. Furthermore, we narrow in on the South East Europe (SEE) region (with the following countries analyzed: Slovenia, Croatia, Bosnia & Herzegovina, Serbia, Montenegro and North Macedonia), as responding to calls [5] to focus on the SEE (as a part of the wider Eastern Europe region). In the entire Eastern and Southern Europe, significant issues in education for sustainable development have been identified, such as *"a lack of adequate instruction materials, the inefficient use of the capacity of higher education and research institutions, a shortage of skilled educators and insufficient awareness-raising, as well as a lack of interdepartmental and multi-stakeholder cooperation on ESD"* [5].

Against this background, we define the following research questions (RQs):

(1) RQ1: Are there differences across SEE countries in their contribution to the sustainable development education research?
(2) RQ2: How do SEE countries compare to other European countries regarding their sustainable development education contribution?
(3) RQ3: What are the productivity and impact of the SEE higher education institutions in the sustainable development education research?

By answering these research questions, we contribute to the contextualization of sustainable development education research and its significance in academic practice. Furthermore, we generate propositions for higher education policies in the field of sustainable development, with a particular focus on the developing European regions (such as the SEE).

2 Methods

To capture the general trends in the development of the sustainability education literature, in the first step, we performed a bibliometric search of the Elsevier Scopus database by using the broad phrase of *'education for sustainability',* as recommended by Wu & Shen [6]. It should be noted that the query performed does not necessarily cover the entire sustainability education literature but rather serves as a proxy for the assessment of global research trend [6]. Further bibliometric research is needed to develop a comprehensive query covering the entire scientific topic.

The query is further filtered for the original scientific papers and reviews published in Scopus-referred journals since 2016 to capture the five-year period. The resulting Scopus advanced search query is as follows:

```
TITLE-ABS-KEY("education for sustainability") AND (LIMIT-TO
(PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020)  OR
LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO
(PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016)) AND (LIMIT-TO (DOCTYPE,"ar")
OR LIMIT-TO (DOCTYPE,"re"))
```

Results of the global trends in the sustainability education literature, based on our initial query of Scopus-indexed publications, are presented in Sect. 3.1 of this study.

In the second step of the analysis, presented in Sect. 3.2 of the paper, we use the predefined bibliometric reporting to zero in on the research output of SEE countries and institutions. Instead of developing the own comprehensive query to capture the SEE region's sustainable development eduction research topic, we used the OECD Fields of Research and Development (FORD) classification [7]. This classification is available with the Elsevier SciVal scientometric software solution for reporting and benchmarking scientific productivity and impact. SciVal also uses the latest available Scopus data but makes it relatively easy to employ a wide range of performance metrics and conduct benchmarking on the personal, institutional, or national levels [8].

In SciVal, we used the FORD topic *'Education for Sustainability; Higher Education Institutions; Sustainability Science and Engineering'* (topic code T.3407) to analyze the relevant regional literature.

3 Results

3.1 Scopus-Based Bibliometric Overview of General Trends in the Academic Literature on Sustainable Development Education

The general query of the Scopus database in the first step resulted in 395 documents, showing slow but continuous growth in the researchers' interest in the sustainability education throughout the 2016–2021 period – starting with less than 50 outputs in 2016, reaching more than 80 outputs in Scopus-referred journals annually in 2021.

The most productive countries, from the viewpoint of scientific output, are Spain (75 Scopus documents), Australia (64), US (41), UK (38), Sweden (24), Brazil (19), Germany (17), Norway (15), Israel (13) and Turkey (13). The most productive institutions in the field are: Spanish Universidad de Granada leading (11 Scopus documents in the analyzed period); Queensland University of Technology (9 outputs); Universidad de Cadiz (9 outputs); Deaking University (9 outputs); James Cook University (8 outputs); Universidad del Pais Vasco (8 outputs), etc.

This research field is a multi-disciplinary one, with the majority of research output (337 documents, i.e., 41.9%) belonging to social science, followed by environmental science (154 documents, i.e., 20.4%), energy research (120 documents, i.e., 14.9%), business, management, and accounting (48 documents, i.e., 6%), etc.

All identified documents received Scopus citations in the 2016–2021 period, with a total number of 3,265 citations. The researchers' interest in the topic increases, with less than ten citations of the analyzed body of literature before 2017, increasing to 1,440 citations in 2021. The ten most cited studies in Scopus are presented in Table 1.

Only three SEE studies in the analyzed Scopus corpus were obtained by a simple query (two with co-authors with affiliations from Serbia and Slovenia and one from

Table 1. The most cited Scopus journal papers in sustainability education research (2016–2021)

Reference	Year of pub.	Cit. < 2017	Cit. 2017	Cit. 2018	Cit. 2019	Cit. 2020	Cit. 2021	Cit. 2016–2021
Annan-Diab, F., & Molinari, C. (2017). Interdisciplinarity: Practical approach to advancing education for sustainability and for the sustainable development goals. *International Journal of Management Education, 15*(2), 73–83. https://doi.org/10.1016/j.ijme.2017.03.006	2017			11	24	45	52	**132**
Aleixo, A. M., Leal, S., & Azeiteiro, U. M. (2018). Conceptualization of sustainable higher education institutions, roles, barriers, and challenges for sustainability: An exploratory study in Portugal. *Journal of Cleaner Production, 172*, 1664–1673. https://doi.org/10.1016/j.jclepro.2016.11.010	2018		2	8	28	37	53	**128**
Leal Filho, W., Raath, S., Lazzarini, B., Vargas, V. R., de Souza, L., Anholon, R.,… Orlovic, V. L. (2018). The role of transformation in learning and education for sustainability. *Journal of Cleaner Production, 199*, 286–295. https://doi.org/10.1016/j.jclepro.2018.07.017	2018			2	23	43	55	**123**
Tejedor, G., Segalàs, J., & Rosas-Casals, M. (2018). Transdisciplinarity in higher education for sustainability: How discourses are approached in engineering education. *Journal of Cleaner Production, 175*, 29–37. https://doi.org/10.1016/j.jclepro.2017.11.085	2018			6	20	30	21	**77**
Setó-Pamies, D., & Papaoikonomou, E. (2016). A multi-level perspective for the integration of ethics, corporate social responsibility and sustainability (ECSRS) in management education. *Journal of Business Ethics, 136*(3), 523–538. https://doi.org/10.1007/s10551-014-2535-7	2016	1	8	6	18	27	17	**76**
Howlett, C., Ferreira, J. -., & Blomfield, J. (2016). Teaching sustainable development in higher education: Building critical, reflective thinkers through an interdisciplinary approach. *International Journal of Sustainability in Higher Education, 17*(3), 305–321. https://doi.org/10.1108/IJSHE-07-2014-0102	2016	1	3	9	22	11	21	**66**

(*continued*)

Table 1. (*continued*)

Reference	Year of pub.	Cit. < 2017	Cit. 2017	Cit. 2018	Cit. 2019	Cit. 2020	Cit. 2021	Cit. 2016–2021
Evans, N. S., Stevenson, R. B., Lasen, M., Ferreira, J. -., & Davis, J. (2017). Approaches to embedding sustainability in teacher education: A synthesis of the literature. *Teaching and Teacher Education, 63*, 405–417. https://doi.org/10.1016/j.tate.2017.01.013	2017		2	9	17	11	25	**64**
Tejedor, G., Segalàs, J., Barrón, Á., Fernández-Morilla, M., Fuertes, M. T., Ruiz-Morales, J.,… Hernández, À. (2019). Didactic strategies to promote competencies in sustainability. *Sustainability (Switzerland), 11*(7) https://doi.org/10.3390/su11072086	2019				4	19	25	**48**
Bell, D. V. J. (2016). Twenty-first century education: Transformative education for sustainability and responsible citizenship. *Journal of Teacher Education for Sustainability, 18*(1), 48–56. https://doi.org/10.1515/jtes-2016-0004	2016	1	2	10	10	12	12	**46**
Giangrande, N., White, R. M., East, M., Jackson, R., Clarke, T., Coste, M. S., & Penha-Lopes, G. (2019). A competency framework to assess and activate education for sustainable development: Addressing the UN sustainable development goals 4.7 challenge. *Sustainability (Switzerland), 11*(10) https://doi.org/10.3390/su11102832	2019				5	21	20	**46**

Source: Authors, based on Elsevier Scopus data (December 2021).

Croatia). However, the Elsevier SciVal analysis revealed the existence of the entire body of regional literature. The complete list of those publications is available as an online resource (appendix) to this study, along with a list of the most influential 100 European authors in the field, as well as authors from the SEE region, belonging to the top 500 most influential researchers in Europe [9].

3.2 Productivity, Impact, and Benchmarking of South East European Countries and Institutions in Sustainable Development Education Research

Based on the previously described SciVal procedure, the national productivity of European countries in the research of sustainability education can be evaluated. Concerning RQ1 and RQ2, national scientific productivity results are presented in Table 2. These provide data on the top ten European countries and the SEE nations and their rank. Performance assessment is based on the scholarly output, i.e., the number of Scopus-indexed publications. The table also reports the total citation count and the Field-Weighted Citation Impact (FWCI). It is a popular metric, which enables individuals, institutions, and countries to compare the impact of their research directly. FWCI normalizes contextual

factors' influence on the citation count by comparing the number of citations received to the expected number of citations. The averages determine the expected citation rate for the field and the document type. FWCI value of 1.0 sets the global benchmark of average research impact, with values higher than 1.0, indicating the above-average impact [10].

Table 2. Top ten European countries and SEE nations' performance in sustainable education research (2016-)

	Country	Scholarly output	National research field-weighted citation impact	Citation count
1	Spain	442	1.51	3090
2	United Kingdom	440	1.36	3512
3	Germany	296	1.58	2307
4	Italy	150	1.18	825
5	Portugal	150	1.32	1229
6	Sweden	137	1.63	1438
7	Russian Federation	110	0.73	240
8	Netherlands	105	1.22	755
9	Poland	95	0.7	320
10	Finland	78	1.07	499
22	**Serbia**	**25**	**1.87**	**345**
25	**Slovenia**	**22**	**0.59**	**87**
28	**Croatia**	**15**	**0.65**	**26**
34	**North Macedonia**	**4**	**0.47**	**21**
38	**Bosnia & Herzegovina**	**1**	**0.00**	**0**

Source: Authors, based on Elsevier SciVal data (December 2021).

Out of the analyzed SEE countries, only Serbian researchers have a relatively high FWCI score, which results from a relatively high number of citations received by the scholarly output, comparable to other SEE countries.

Concerning RQ3, it should be noted that none of the SEE research organizations belong to the top ten European institutions in the research of sustainability education (see Table 3). University of Belgrade (Serbia) ranks as the 33rd European institution in the field, with small output but a very high FWCI, consistent with the Serbian national research performance. University of Maribor (Slovenia) is the only other SEE research organization in the top 100 European institutions in the field, with nine research publications and an institutional research FWCI value of 0.87. Such an output seems to result from a small research group affiliated with individual researchers from Croatia, Bosnia & Herzegovina, and Serbia.

Table 3. Top ten European research institutions and SEE institutional performance in sustainable education research (2016-)

	Institution	Country/Region	Scholarly output	Institutional research field-weighted citation impact	Citation count
1	Polytechnic University of Catalonia	Spain	53	2.03	563
2	Manchester Metropolitan University	United Kingdom	52	2.46	976
3	Leuphana University of Lüneburg	Germany	48	2.86	568
4	Hamburg University of Applied Sciences	Germany	47	2.28	718
5	University of Aveiro	Portugal	38	2.54	640
6	University of the Basque Country	Spain	37	1	127
7	University of Seville	Spain	29	3.12	304
8	Delft University of Technology	Netherlands	28	1.24	168
9	University of Lisbon	Portugal	28	0.76	127
10	Aalborg University	Denmark	27	1.19	207
33	**University of Belgrade**	**Serbia**	**17**	**2.41**	**314**
90	**University of Maribor**	**Slovenia**	**9**	**0.87**	**51**

Source: Authors, based on Elsevier SciVal data (December 2021).

The most productive European researcher in the field is Walter Leal Filho, affiliated with the Hamburg University of Applied Sciences in Germany, with a scholarly output of 46 publications, 954 citations, and the FWCI value of 2.52 since 2016. Only one SEE researcher affiliated with the University of Belgrade (Serbia) is ranked (on the 84th position) among the top 100 European individuals, according to their performance and impact in sustainability education research. Since the entire author list is too large to be reproduced and could be of limited interest to the readers, it is available as an online resource

(appendix) [9]. It should be noted that additional seven individuals from the SEE region, with affiliations from the University of Maribor and University Primorska (Slovenia), the University of Zagreb and University of Split (Croatia), and the University of Nis (Serbia) are ranked among the top 500 European researchers in the field. Their current rank and bibliometric data are also available in the online resource (appendix) [9].

4 Discussion

As far as the authors are informed, this study is among the few which attempts to understand the sustainability education research in the SEE region. Thus, identifying the productivity and impact of SEE higher education institutions offers a baseline against the future growth of this field in the SEE countries.

The study attempts to address three research questions. In terms of the productivity and impact of the SEE countries in the sustainable development education research, the findings show that the entire SEE region does not follow the global trends. Our analysis of the extant sustainability education research literature and the bibliometric analysis performed by Hallinger and Chatpinyop [4] reveal that the field seems to be multiplying, which is not the case with the regional literature. In addition, among the analyzed countries (Croatia, Bosnia & Herzegovina, North Macedonia, Serbia, Slovenia), only researchers from Serbian institutions achieved the above-average impact, measured by the value of the FWCI metric above 1. However, the achieved level of influence was the result of several highly influential individual contributions, rather than the outcome of the systematic work on the sustainable development issues, planned and supported by the scientific policy (for instance, Serbia has 25, while top-ranked Spain has 442 scholarly outputs in the observed period).

In terms of the differences across SEE countries, regarding their contribution to the sustainable development education research, our results show that only Serbia (25), Slovenia (22), and Croatia (15) have increasing scholarly output (although still relatively low compared to other top performing countries). At the same time, North Macedonia and Bosnia & Herzegovina just stepped into the field. Although there is a difference between SEE countries, two clusters are forming, with one consisting of Serbia, Slovenia, and Croatia, and the other cluster including North Macedonia and Bosnia & Hercegovina.

Results of our study also show a significant gap between the SEE countries and other European countries in terms of their sustainable development education contribution. This is not surprising since there exists evidence that the generated knowledge is concentrated in a small number of developed economies. Hallinger and Chatpinyop [4] show that only 16% of the literature was authored in developing countries, representing a considerable challenge for sustainable development research. On the one hand, developed countries cannot assume that the sustainability perspectives, policies, measures, and educational curriculum are easily exported to the developing countries. On the other hand, developing economies, such as observed SEE countries, need to set up different programs for research funding, encouraging various forms of sustainable development research.

Also, HEIs have to encourage world-class research, leading to a higher impact. This is especially important when the productivity and impact of SEE HEIs are considered

since none of them belongs to the top thirty European institutions in sustainability education research. Only the University of Belgrade, Serbia, and the University of Maribor (Slovenia) rank among the top 100 European institutions in the field.

5 Conclusion

This study demonstrates the urgent need for the SEE countries to focus on all forms of sustainable development research, including the sustainable development education field. Namely, it is widely accepted that *"education will play a key role in the global effort to achieve the UN's sustainable development goals"* [4]. Only by creating an interdisciplinary field of research in the years to come, SEE countries still have an opportunity to create a knowledge base, which will potentially influence public policy and practices in the area of sustainable development. The emphasis on interdisciplinarity should *"open the eyes and minds"* of both the academic and the general public related to the complexities of today's development. Integrating disciplines facilitates problem-solving by displaying how different researchers deal with the same issue. Complex sustainability topics, broken into environmental and social development issues, ask for the integration of various types of knowledge and their alignment, which is the crucial task of the academic sector [11].

Apart from interdisciplinarity, Alexio, Leal, and Azejteiro [12] recognize two additional issues that determine higher education policies supporting sustainable development: community empowerment and fundraising and funding. The first issue goes hand in hand with the fundamental role HEIs have in every society – particularly with their effect on shaping the narrative and dealing with relevant topics in their communities. In general, the second issue is appropriate both for HEIs and for sustainable development issues. Namely, to boost the effects of their actions and transfer them to practice, HEIs need funding, and they also need to be equipped with relevant skills and expertise to obtain funding. In general, since funding holds significant financial leverage for HEIs, one way to achieve sustainability-related goals is through funding instruments. One of the great examples of such leverage is the Horizon Europe program (the largest research funding program of the EU, which includes other countries) and its recent actions on gender equality. Namely, *"for Horizon Europe calls for proposals with deadlines in 2022 and beyond, applying public bodies, research organizations and higher education institutions, from EU Member States and associated countries, must have a GEP or equivalent strategy in place to be eligible for funding.*" [13].

As related to the educational practice in higher education and the potential policy orientation, it should be noted that Giangrande et al. [14] develop a framework with a set of competencies that institutions should develop with their students to support sustainable development. Those competencies are interpersonal, strategic planning, normative competencies, anticipatory skills, systemic thinking, intrapersonal competency. Furthermore, they outline the applicability of those competencies across various disciplines, such as human rights or global citizenship.

Finally, the sustainable development orientation of HEIs has been recently recognized as a part of the well-known university ranking schemes, such as the SDG-related Impact Rankings, developed by the Times Higher Education (THE). Although criticized

for the commercialization of university data and potential transparency and data validity [15], the Impact Ranking shows the general trend of involving multiple stakeholders in assessing HEI sustainability. With the rankings being also crucial for university funding and international enrollment [16], sustainability research conducted by universities comes into the spotlight. For instance, THE Impact Ranking tracks SDG-related teaching, outreach, and research using different indicators and weights. The research component is measured using the scholarly output and Field-Weighted Citation Impact (FWCI) metrics, computed from Elsevier Scopus data [17].

In terms of the limitations, this study shows constraints of the 'plain' Elsevier Scopus database when reporting and benchmarking research productivity and impact. Although this can be done, it requires both a thorough understanding of the field and bibliometric (scientometric) skills to develop a relevant Scopus query and perform the required analysis. On the other hand, scientometric reporting tools, such as Elsevier SciVal, make this task much more straightforward and accessible to individuals and organizations who do not possess scientometric skills and experience. The same objective can be achieved using the Clarivate Web of Science ecosystem, including the Web of Science referencing products and the Clarivate InCites scientometric tool.

In addition, this study did not analyze the research methods used that dominate the field. An analysis of research methods is crucial because it can point to the limitations of the existing knowledge if it is biased towards a particular methodology and techniques.

References

1. UNDP Sustainable Development Goals. https://www.undp.org/sustainable-development-goals. Accessed 2 Jan 2022
2. Rubens, A., Spigarelli, F., Cavicchi, A., Rinaldi, C.: Universities' third mission and the entrepreneurial university and the challenges they bring to higher education institutions. J. Enterprising Commun. People Places Global Econ. **11**(3), 354–372 (2017)
3. Adomßent, M., et al.: Emerging areas in research on higher education for sustainable development–management education, sustainable consumption and perspectives from Central and Eastern Europe. J. Clean. Prod. **62**, 1–7 (2014)
4. Hallinger, P., Chatpinyakoop, C.: A bibliometric review of research on higher education for sustainable development, 1998–2018. Sustainability **11**(8), 2401 (2019)
5. United Nations Economic Commission for Europe Strategy for Education for Sustainable Development. https://unece.org/esd-strategy. Accessed 2 Jan 2022
6. Wu, Y.C.J., Shen, J.P.: Higher education for sustainable development: a systematic review. Int. J. Sustain. High. Educ. **17**(5), 633–651 (2016)
7. OECD: Frascati Manual 2015: The Measurement of Scientific, Technological and Innovation Activities. In: Guidelines for Collecting and Reporting Data on Research and Experimental Development. OECD Publishing, Paris (2015)
8. Dresbeck, D.R.: SciVal. J. Med. Libr. Assoc. JMLA **103**(3), 164–166 (2015)
9. Alfirević, N., Arslanagić Kalajžić, M., Škokić, V.: Bibliometric data on sustainable education research in South East Europe (2016). Figshare. https://doi.org/10.6084/m9.figshare.17711162
10. Purkayastha, A., Palmaro, E., Falk-Krzesinski, H.J., Baas, J.: Comparison of two article-level, field-independent citation metrics: Field-Weighted Citation Impact (FWCI) and Relative Citation Ratio (RCR). J. Informet. **13**(2), 635–642 (2019)

11. Annan-Diab, F., Molinari, C.: Interdisciplinarity: practical approach to advancing education for sustainability and for the sustainable development goals. Int. J. Manag. Educ. **15**(2), 73–83 (2017)
12. Aleixo, A.M., Leal, S., Azeiteiro, U.M.: Conceptualization of sustainable higher education institutions, roles, barriers, and challenges for sustainability: an exploratory study in Portugal. J. Clean. Prod. **172**, 1664–1673 (2018)
13. European Commission, Directorate-General for Research and Innovation: Horizon Europe guidance on gender equality plans. https://data.europa.eu/doi/10.2777/876509. Accessed 2 Jan 2022
14. Giangrande, N., et al.: A competency framework to assess and activate education for sustainable development: addressing the UN sustainable development goals 4.7 challenge. Sustainability **11**(10), 2832 (2019)
15. Hazelkorn, E.: Are rankings (Still) fit for purpose? In: van't Land, H., Corcoran, A., Iancu, D.-C. (eds.) The Promise of Higher Education, pp. 293–299. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-67245-4_45
16. Bound, J., Braga, B., Khanna, G., Turner, S.: The globalization of postsecondary education: the role of international students in the US higher education system. J. Econ. Perspect. **35**(1), 163–184 (2021)
17. Times Higher Education Impact Rankings Methodology 2022 (Version 1.2). http://www.osm.kmitl.ac.th/osm2020/file/SDG/%E0%B8%84%E0%B8%B9%E0%B9%88%E0%B8%A1%E0%B8%B7%E0%B8%ADTHE.ImpactRankings.METHODOLOGY.2022.pdf. Accessed 2 Jan 2022