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How Important are the Sustainable Development Goals? A Bibliometric and Modern Data Analysis

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Abstract

The Millennium Development Goals were adopted by the UN in 2000, the main objective being to reduce extreme poverty by 2015. This perspective from the beginning of the millennium was to shape the direction of the world towards sustainable development. The 2030 Agenda for Sustainable Development, adopted by all UN member states in 2015, offers a common perspective to follow in order to ensure peace and prosperity for people and planet. This paper aims to highlight the significance of sustainable development by tracking it in literature and day-to-day media. A bibliometric study is used to identify its research importance and to highlight the importance of the different goals of the UN: no poverty, zero hunger, good health and well-being, quality education, gender equality, etc., having into consideration the frequency of their appearance in academic literature and media. The paper starts from the premise that each goal represents an up to date topic in the research world.

Keywords: sustainable development; Millennium Development Goals (MDGs); Sustainable Development Goal (SDGs); bibliometrics; research; journalistic data; social media.

JEL Classification: Q01

1. Introduction

Sustainability is, in fact, the ability to maintain the integrity of an entity over time (Basiago, 1999) while in practice and in the academic vocabulary the concept is applied in order to promote a healthy socio-economic and ecologic environment for the human society (Milne & Gray, 2013). The term of sustainability is defined as an efficient and equitable sharing of resources along generations in order to operate socio-economic activities of a finite ecosystem (Stoddart, et al., 2011).

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Sustainable development represents the principle of achieving human development while at the same phase sustaining the natural systems to provide the input that the society depends on (Cerin, 2006). Global parties have always been public on promoting the efficient use of global resources.

The up to date concerns into this theme are represented by the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs), where both of these topics mark historic global mobilization to achieve worldwide targets (Breuer, et al., 2019). After the 15 years' time frame of the MDGs', their proposed goals were not 100% achieved, hence, the today's need of a new set of goals, that are to be reached by 2030, which is in fact a call for action; the main themes of those SDGs are widely spread, summarized in the permanent focus on the people, planet, peace, prosperity and partnerships (Taylor, 2016).

2. Problem Statement

Multiple academics, increasingly in the latest decades, have concentrated on innovative analysis and research resulting in a material growth in this area of academic activity (Cancio, et al., 2017). This item was solely demonstrated not only through daily publication tracking, but also by the increasingly number of research and education centres that are set up. Places of such importance are gathering more and more specialists, that are continuously innovating and improving the business process of sustainability research (Chen, et al., 2010) (Cancino, et al., 2015) (Fagerberg, et al., 2012).

As the number of innovative publications and research grows, it is quintessential to further investigate what are the main topics of the most productive and influential figures in the research branch, together with the need of identifying the major papers and source universities.

Sustainability research is more than a knowledge search, it is meant to offer a secure future. Conventional academic research, with strong methodology foundations, tends towards shallow analyses and weak improvement proposals as they are solely proposing to engage with the studied subject and become the impetus for change, while shifting towards sustainable thinking in any topic requires more than just plans and overthinking but organized action (McManners, 2019).

This paper is proposing the analysis of the scientific research regarding SDGs in order to demonstrate the importance of this topic in modern times and aims to correlate journalistic data and social media to this topic.

3. Research Questions / Aims of the Research

The current study is, firstly, wanting to show how relevant are the SDGs in the perspective of current research and then, to describe the multiple applications of the SDGs.

The research question represents the title of the report and describes the importance of the SDGs. How important are the Sustainable Development Goals?

The real significance of the research question is, by answering it, to identify and state how often the SDGs appear in multiple kinds of information sharing channels.

A predefined search approach at this research stage consists in presenting the multiple kind of data used, such as, bibliographic, authorship and journalistic, that is going to be reviewed with modern software and multiple contextual adapted and on scope methods. The effective search will be completed through scientifically proven engines on research databases of peer-reviewed, subscription-based and open-access literature.

The second research objective wants to show that the SDGs are an up-to-date research topic and they can be easily found in all major aspects of our lives.

Research hypothesis tested in this piece of research is: SDGs do represent an important part of academic research, and more than this, it actually represents a subject that is highly popular among different parties.

4. Research Methods

For multiple years, bibliometrics have been used quite frequently in literature, due to its advanced opportunity in affirming specific or general areas of interest. To completely understand the importance of bibliometrics, multiple definitions have been noted. As Pritchard (1969) noted, it is mostly a mathematical and statistical methodology that translates the nature and state of written communication. Broadus (1987) indicates that this methodology signifies a quantitative study of published papers, bibliographic entries or both. Easier, Norton (2001) defines this concept as a direct assessment of textual data. In the last two decades, new uses have been attributed to bibliometrics. In accordance with Daim (2006) the recent path aims toward exploration, organization and large-scale data analysis of historical entries in order to observe the unseen patterns that may help researchers in the process of decision making.

In the following paragraphs, the current research design will be presented.

As a starting point, the keyword interrogations will be performed as a data curtain, specific academic literature will be reviewed using the citation analysis, words frequency (Zipf, 1932) and a modern approach on multiple information media.

5. Findings

The results of the multiple analyses are summarized in Table 1 where the value of link strength indicator represents the interlinkage of each paper based on the citation methodology (both quantitative and co-authorship) and in Table 1A a summary of top 5 words (with the occurrence threshold of 10) will be presented for each database (based on binary counting). The curious note that needs to be noticed is the lack of word multiple counting as going towards more than two keyword searches. It is impossible to find a matching word by top occurrence confirming the uniqueness of each paper and publication source. Excluding the development related phrases for the occurrences, it can be stated that the databases come, in this case, to complete each other not to duplicate the results. In the relevance ranking of

the words, it can also be noticed the independence of the terms between the sources. These two perspectives on the top 5 terms represent the importance of dataset selection when studying a topic.

Table 1. Result of the Quantitative Co-Authorship analyses

Set of Keywords	Database interrogated	Unit: Authors/Countries	Link strength (top3)	Citations (top3)	Documents (top3)
Agenda 2030	WOS	Stenberg, K.; Stafford-Smith, M.; Alderman, H.	28, 27, 22	157, 135, 9	2, 2, 1
Agenda 2030	WOS	U.S.A.; Switzerland; U.K.	150, 117, 115	1081, 656, 958	98, 55, 61
Agenda 2030	Scopus	Bhutta, Z.A.; Cowx, I.G.; Lynch, A.J.	37, 34, 34	134, 35, 35	2, 2, 2
Agenda 2030	Scopus	U.S.A.; U.K.; Switzerland	511, 436, 310	5087, 4266, 3572	341, 204, 144
MDG	WOS	Deribew, A.; Melaku, Y. Adama; Misganaw, A.	48, 48, 48	51, 51, 51	3, 3, 3
MDG	WOS	U.S.A.; U.K.; Canada	201, 159, 74	1158, 809, 302	152, 76, 39
MDG	Scopus	Bhutta, Z. A.; Akseer, N.; Daelmans, B.	126, 73, 71	363, 79, 356	23, 8, 5
MDG	Scopus	U.S.A; U.K.; South Africa	588, 443, 229	6306, 4103, 1450	521, 310, 153
SDG	WOS	Lawford, R.; Anand, M.; Bahadur, K.	21, 20, 20	20, 18, 18	2, 1, 1
SDG	WOS	U.S.A.; U.K.; Australia	219, 165, 126	1314, 1187, 764	116, 78, 53
SDG	Scopus	Wang, J.; Li, Y.; Wang, X	46, 38, 38	15, 23, 18	14, 12, 8
SDG	Scopus	U.S.A.; U.K.; Germany	599, 505, 263	238, 199, 84	341, 250, 126
Sustainable development	WOS	Al-Adawi, S.; Boyling, C.; Braithwaite, J.	18, 18, 18	5, 5, 5	1, 1, 1
Sustainable development	WOS	U.S.A.; U.K.; China	107, 79, 79	371, 203, 852	62, 39, 128
Sustainable development	Scopus	Chen, X.; Wang, Y.; Wang, J.	72, 72, 70	17, 6, 16	18, 33, 30
Sustainable development	Scopus	China; U.K.; U.S.A.	374, 331, 315	148, 83, 63	611, 193, 250

Source: VOSviewer

Table 1A. Top 5 words occurrences in both Title & Abstract search

Keyword	Source	Top 5 by occurrences (# of occ.)	Top 5 by relevance (relevance rating)
Agenda 2030	WOS	nation (105), health (82), person (79), indicator (73), development agenda (71)	nutrition (4.57), disaster risk reduction (4.27), sendai framework (3.92), agriculture (3.75), territory (3.64)
Agenda 2030	Scopus	approach (64), study (63), country (44), city (40), china (36)	agriculture (2.36), climate change (2.28), sustainable development agenda (1.86), violence (1.61), united nations sustainable development... (1.41)
MDG	WOS	development goal (286), sust. dev. goal (183), data (162), development (139), sdgs (99)	climate change (3.39), civil society (3.33), cross sectional study (2.58), vision (2.30), live birth (2.19)
MDG	Scopus	approach (64), study (63), country (44), city (40), china (36)	agriculture (2.36), climate change (2.28), sustainable development agenda (1.86), violence (1.61), united nations sustainable development... (1.41)
SDG	WOS	data (120), health (84), process (83), target (82), indicator (74)	global burden (4.92), cause (3.82), mortality (3.58), death (3.55), estimate (3.26)
SDG	Scopus	health (59), evidence (49), implementation (40), agenda (40), application (39)	relationship (2.26), circular economy (2.02), concept (1.91), influence (1.75), comparative analysis (1.5)
Sustainable development	WOS	region (74), technology (68), production (67), application (67), growth (61)	sdg (3.53), catalyst (3.22), ecosystem service (3.12), forest (2.52), urbanization (2.16)
Sustainable development	Scopus	review (112), application (82), sus dev goal (39), evidence (38), role (36)	ecosystem service (2.02), comparison (2.01), carbon emission (1.9), climate change (1.85), systematic review (1.33)

Source: VOSviewer – Software interpretation

In the following paragraphs, the second stage of the bibliographic data interpretation will be presented. It can be noticed in Table 2 that the results come in different ways, depending on the search procedure. The topic that is the most researched is based on the keywords search of the "sustainable development" in both the title and the abstract of the research papers that were in scope. It can also be noticed that the time frame matches with the start of the sustainable development era, reflecting the primary efforts in late 1980. By this solely part of the research, it can be summarized that the sustainable development topic is at its glance in present times and the impressive numbers of citations per year indicate the relevance of this matter throughout the academic world. The h-index (Hirsch index) for the keywords of sustainable development, matching the 287 value indicates the number of papers that have multiple citations with a relevant annual citing index of 6.85. In the "sustainable development goal" search, there are a lot of papers about this topic within their abstract while a smaller number of papers contain this word group in their title. Similar situation for the "millennium development goal" while "agenda 2030" search appears to track the papers starting from 2009 matching the transition from the 2000-2015 period to the current one of 2015-2030 that introduces Agenda 2030 as the new guiding strategy towards sustainable development. When analysing the number of research papers containing the 4-word groups in their abstract and title, it can be noticed in Figure 1 that the most prolific years in terms of publishing were 2019 for Agenda 2030, 2017 for the SDGs, 2010 for the MDG and 2006 for sustainable development. Truly when considering both peer-reviewed and open access research work, the SDGs represent an up to date topic.

Table 2. Google Scholar interrogation

(Search type) & Key Words	Publication years	Papers	Citations	Citations/ year	Citations/ paper	Authors / paper	h-index	g-index	h-norm	h-annual
(Abstract) Agenda 2030	1998-2020	990	8,734	397	8.82	1.86	37	82	30	1.36
(Title) Agenda 2030	2009-2020	1000	6,275	570.45	6.28	1.7	32	66	25	2.27
(Title) MDG	2003-2016	49	125	7.35	2.55	1.63	4	9	3	0.18
(Abstract) MDG	1986-2020	980	33,811	994.44	34.5	1.89	78	171	60	1.76
(Title) SDG	1989-2020	958	4,921	158.74	5.14	2.04	31	56	20	0.65
(Abstract) SDG	1981-2020	980	160,408	4,113.03	163.68	2.44	196	358	145	3.72
(Title) Sustainable development	1984-2020	980	314,526	8,736.83	320.94	2.12	287	508	234	6.5
(Abstract) Sustainable development	1986-2020	980	316,009	9,294.38	322.46	2.1	287	508	233	6.85

Source: Publish or Perish – software interpretation

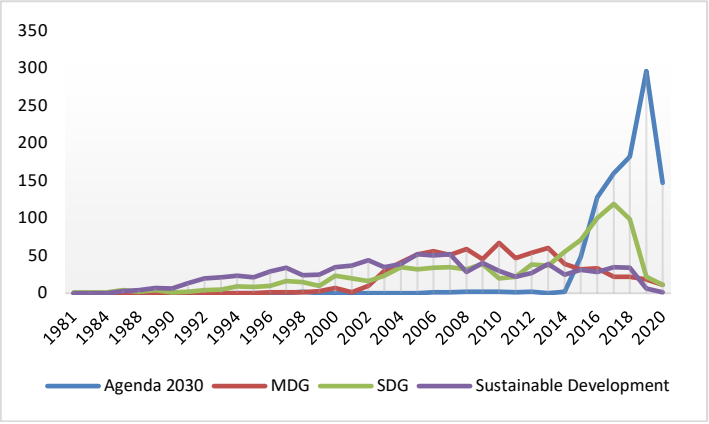

Figure 1. Number of papers by year
Source: Google Scholar – Publish or Perish interpretation

The newspaper analysis, the first part of the non-academic analysis can be noticed through applying direct correlation thinking as the following:

Figure 2. Multiple snips from The New York Times website
Source: Official website of the newspaper

In Figure 2 where several snips of the main headlines have been taken from three different dates (the exact date of the headline can be seen bordered in red) several assumptions have been made, most of them are freely noticeable and can easily be induced in the same manner. For example, out of the 7 titles chosen, 4 were guided by the current pandemic state but even though this theme is largely spread across all media, key SDG data could also be traced, as for example the headline with number 7 where the respective article presents a restaurant that promotes no food waste, a principle that is strongly in accordance with the SDG 2 and SDG 12. This newspaper has also several themes that automatically filter the shown information (action that can also be found in the upcoming sources) that clearly guide the reader into a better understanding of the SDGs traceability and this could represent an opportunity for future SDG transparency.

Figure 3. Multiple snips from The Guardian website

Source: Official website of the newspaper

In Figure 3, the same process has been applied. Similarities, including the topic dashboard, are obvious but the most important thing is that there are news that are not correlated to the current health aspect of our times but of course those snips have been selected from multiple titles that surely included COVID-19 related notes.

Both of these papers present their headlines together with a short summary, important thing that was taken in consideration when the correlation to the SDG was made.

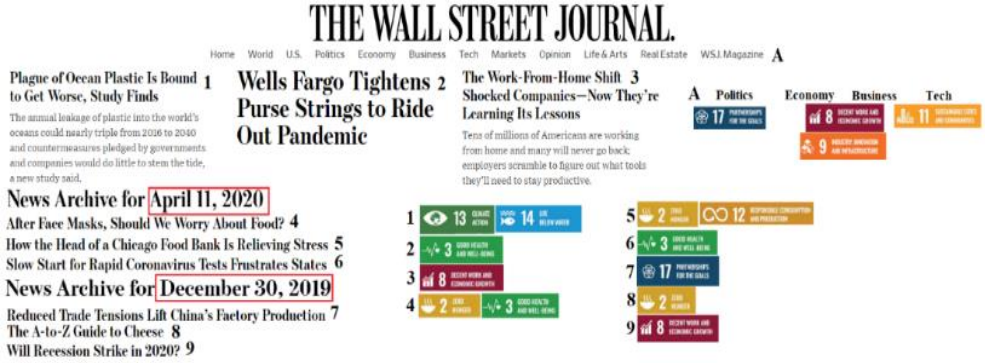

Figure 4. Multiple snips from The Wall Street Journal website

Source: Official website of the newspaper

The following source can be noticed in Figure 4, where again, similarities have been noted as the topic dashboard and pandemic topics. This newspaper website does not include summaries for the past articles, but conclusions had been taken out without any issue, just from the headline.

Figure 5. Multiple snips from the Financial Newspaper (Ziarul Financiar)
Source: Official website of the newspaper

And as a final newspaper, an important Romanian piece has been chosen as it has a large variety of topics out of the tabloid world. Figure 5 shows a non-English source, but key info can be drawn from the short summaries as headlines are not present this time. The first article describes the difficultness that the small local producers in the pasta food sector face in the market. The second article describes the need of zootechnical investment for the national agriculture; the third part refers to the permanent need of continuous learning, while the last paragraph indicates the IT innovation of several youngsters.

All the SDGs correlations of these newspapers' snips can be noticed in Table 3 where SDG 3 has truly dictated the global news, but new topics emerge daily and it is clear that the SDG transparency can be applied even at this level of information sharing.

Table 3. Summary of the SDGs correlated to the Newspapers articles

Source	Number of interrogations	Month of the interrogations (current year)	Selected articles	Most frequent SDG (# of times)	Least frequent SDG (# of times)	Most SDGs per headline	Dashboard leading to what SDG (not all)
The New York Times	3	July, July & January	7	SDG 3 (4 times) due to COVID-19 followed by SDG 2, 8, 10 &12 (the three of them linked 2 times each)	SDG 9, 14 & 16 (1 time each)	4 goals (SDG 2,3,10 & 12)	Business SDG 8; Politics SDG 16 & Tech, Science SDGs 7 & 9
The Guardian	3	July, March & January	9	SDG 16 (3 times)	SDG 2, 5, 10 & 12 (1 time each)	1 goal	Environment SDG 13, 14 & 15; Coronavirus SDG 3; Global Development SDG 8 & 9
The Wall Street Journal	3	July, April & December 2019	9	SDG 3 (3 times); SDG 2 (3 times)	SDG 12 & 13 (1 time)	2 goals (SDG 2,3 & 12)	Politics SDG 17; Economy & Business SDG 8 & 9; Tech SDG 11
The Financial Newspaper (Ziarul Financiar)	3	July only	4	SDG 2 & 8 (2 times)	SDG 4 (1 time)	2 goals (SDG 2, 8 & 2, 12)	Focused on financial topics but the Business from Zero correlates to SDG 8

Source: Own interpretation based on the info available on the official websites of the newspapers

For the social media analysis, the elected posts do not include personal posts that are intended to promote personal life. The noticeable link to at least one SDG

is the main criteria of selection and further than this, the respective posts show the effort made for achieving the goals and targets of the respective SDG. The selection of influential social media content related to the SDGs can be seen in Table 4 containing the Instagram posts and in Table 5 the complete description of the respective images. The motivation for correlating the respective posts with SDGs is the following: The idea behind the first post (1A) is the cooperation of people to overcome another famous post. As this holds the world record at this moment as the most liked Instagram post, it clearly shows how cooperative people can be successful in their scope. This is the exact manner that must be applied to reach all Agenda 2030 targets for a better world. The 2A post encourages the planting trees operations in Indonesia, showing the need of a better environmental care across the globe while in the second part of the post it counts the number of trees that had been lost since the first reading of the post. SDGs 13 and 15 are the natural choice, but cooperation and awareness can also be shared through this idea. The 3A post of President Obama presents the equal rights of all people. The same principle is highly promoted by the SDGs since their inception while the 4A post of a well-known pop band stands again for equal rights and no violence. Nothing is as appreciable as global efforts to promote peace and equality.

The values that the SDGs promote are universal and the way the current world (influenced by the infinite internet data) evolves must be sustainable. Everyone should learn and follow these opportunities indicated by the SDGs in order to have a better place for everyone and leave no one behind.

Table 4. Instagram posts snip

1A Post	2A Post
	
3A Post	4A Post
	

Source: Instagram

Table 5. Summary of the social media posts in relation to the SDGs

Source	Owner	Post description	Number of likes	Date posted	Image	SDG	Link
Instagram	Chris Godfey	Photo of an egg	54.6 mil	January 4th, 2019	1A	2, 17	https://www.instagram.com/
Instagram	tentree	Planting trees in Indonesia for likes	15.5 mil	April 22nd, 2019	2A	13, 15	https://www.instagram.com/
Twitter	Barack Obama	No one is born hating another person because of the colour of his skin or his background or his religion…	4.3 mil	August 13th, 2017	3A	4, 10, 16	https://twitter.com/
Twitter	BTS	We stand against racial discrimination. We condemn violence. You, I and we all have the right to be respected. We will stand together.	2.1 mil	June 4th, 2020	4A	4, 10, 16	https://twitter.com/

Source: Instagram & Twitter

The events on the SDGs topics will be overseen in the following: the first global event that needs to be mentioned is the yearly United Nations' High-level Political Forum on Sustainable Development, held since 2013, an event that concentrates the plans and efforts made by countries in achieving the Agenda 2030 and it adopts intergovernmental negotiated political declarations. This event is also the place where each state presents the National Reviews. The second event is the Global Forum for National SDG Advisory Bodies, held since 2019, which forms partnerships with the governments to identify clear pathways to achieving the SDGs. The third event, SDG Business Forum, acts like a platform for all stakeholders to perform key dialogue on the distinct role of the private sector in addressing current background for a future that will be reached through sustainable development.

The existence of forums and workshops on the theme of sustainable development and applied through the SDGs represents that it is indeed an important global topic but the lack of clear and structured plans that reflect the budgeting and financial perspectives for all states represent the complexity of this theme and the difficultness of applying a global plan at a national or regional level.

6. Conclusions

The non-academic content analysis used previously provided a contextual framing of the latest and most influential informational media, such as: social media, magazines, newspapers and international governmental meetings. This analysis solely corresponds to strict textual analyses of the presented materials and can be criticized of subjectivism but correlated with additional scientific research methods proves to formulate a satisfactory conclusion.

The systematic literature review has been noticed in the previous chapter where peer-reviewed and open access papers have been analysed in order to show the importance of this topic. In the current pandemic state, a sustainable future is the most appropriate plan to be followed, and what could be more appropriate than well-tailored guidelines from the experts in sustainable development?

The applications of the SDGs find relevance all around us, news, posts and efforts are oriented towards achieving the goals and reaching their targets. The frequency of appearance of related topics is nothing then pure confirmation of the fact that the Sustainable Goals truly represent a durable perspective.

The multiple dataset interrogations show that the numbers of papers have been increasing along the years but nothing as the recent increase in this year in publications related to Agenda 2030 as shown previously, reaching the peak at almost 300 papers per year just in 2019 while the SDGs reached peak around 2017 with 100 papers.

The research question has been answered and the research hypothesis has been validated in multiple ways, showing the relevance of the SDGs throughout academic, political and media environments and all initial objectives have been reached with ease just by presenting the quantitative numbers on this topic.

The review was guided by the principles of systematic review and the data collected through the paper included articles, theses, conference papers and documents available on the before-mentioned systems confirming initial conditions. The documents were clearly identified using both keywords and title components and no restrictions were imposed on the search others than what was already mentioned. The process involved both quantitative content analysis as described in the works of (Elo & Kyngäs, 2008) (Hsieh & Shannon, 2005) (Mayring, 2000) and own design subjective techniques that involve logical correlations. The series of tests, which were manually performed, were aimed at offering further evidence that the SDGs do represent an important theme. Pieces of gathered information were presented in a summarized manner to give a more concise and refined conclusion regarding the relevance of the analysed data.

The process of recovering from this pandemic hit would have to be guided on the principles promoted by the SDGs. This time around, compared to other international crises, humanity has a guideline and clear targets to be achieved. Only a national tailored strategy having the SDGs as guideline can foster economic growth and development of internal systems.

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