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IMPACT OF COVID 19 ON RISK MANAGEMENT AND SUSTAINABLE DEVELOPMENT GOALS

Al-Qudah, Shatha (1); Fuentes Bargues, José Luis (2); Ferrer Gisbert, Pablo S. (3)

(1) Universitat Politècnica de València, (2) PRINS. Dto. Proyectos de Ingeniería.
Universitat Politècnica de València, (3) PRINS. Dto Proyectos de Ingeniería (U.
Politécnica de Valencia)

This article describes and analyses the state of the art and potential areas of research in relation to the impact of COVID-19 on risk management and the Sustainable Development Goals (SDGs). In total, 28 research publications published between 2020 and 2021 related to COVID-19, risk management and the Sustainable Development Goals are analysed in the Web of Science (WOS) core collection database. The publications cover 54 authors, 25 countries and 21 institutions including 17 universities worldwide. Among other techniques, content analysis of the identified articles is used.

Keywords: Covid 19; risk management; SDGs

IMPACTO DEL COVID 19 EN LA GESTIÓN DE RIESGOS Y LOS OBJETIVOS DE DESARROLLO SOSTENIBLE

Este artículo describe y analiza el estado del arte y las áreas potenciales de investigación en relación con el impacto del COVID-19 en la gestión de riesgos y los objetivos de desarrollo sostenible (ODS). En total se analizan 28 investigaciones publicadas entre 2020 y 2021 relacionadas con el COVID-19, la gestión de riesgos y los objetivos de desarrollo sostenible, en la base de datos de la colección central de Web of Science (WOS). Las publicaciones abarcan 54 autores, 25 países y 21 instituciones que incluyen 17 universidades de todo el mundo. Entre otras técnicas, se utiliza el análisis de contenido de los artículos identificados.

Palabras clave: Covid 19; gestión de riesgos; ODSs

Correspondencia: José Luis Fuentes Bargues. Correo: jofuebar@dpi.upv.es



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1. Introduction

The global economy experienced an immediate and massive recession worldwide in 2020 as a result of the coronavirus (COVID-19) pandemic (Wang & Su, 2020). To stop the spread of disease epidemics, many national and subnational governments implemented closures, stay-at-home orders, and encouraged business operations and distance education. These activities have caused severe disruption to non-core institutions such as restaurants, retail centers, and tourist attractions. The service and construction industries have taken a particularly harsh impact. For example, the year-on-year percentage change in the construction sector of most major industrialized countries decreased by more than 50% in 2020, compared to 2019, and increased by 20% in 2021 from 2020 (Brodeur et al, 2020). However, as countries learn how to manage the crisis, the outlook for the construction sector and global economic growth in 2022 and 2023 has become more positive. Although there will be delays in the delivery of construction projects as well as increased costs due to, among other things, the development of health plans to ensure the occupational safety of staff and workers (Hoesli & Malle, 2021).

During the coronavirus pandemic, many construction companies have realized that they will be unable to complete their projects on time. This has resulted in additional costs, such as increasing work capacity and improving plans to support public safety procedures to ensure the safety of the workforce (Barker, 2020). The significance of this present study is to examine the influence of the COVID-19 epidemic on infrastructure sustainability and risk management, using existing literature studies and examination of research published during the pandemic period, using content analysis.

2. Methodology

The methodology has been divided into two stages. The first stage consisted of a search of scientific literature in the Web of Science (WOS) Core Collection database, focusing on the Science Citation Index Expanded and the Social Sciences Citation Index. WOS was chosen as the search engine since it is the most well-regarded and commonly used database for scientific publication analysis (Bautista-Bernal, Quintana-García & Marchante-Lara, 2021). To obtain scientific documents that are directly associated with risk management, sustainable development goals, and COVID-19, the keyword that was employed in the WOS core collection database is ALL= ("COVID-19" AND "Risk management" AND "Sustainable Development goals") to get the full documents that may be helpful in our analysis and mapping.

The second stage consists of a content analysis of the identified articles, to describe the state of the art of influence of COVID 19 on risk management and sustainable development objectives.

3. Findings and results

The search in the WOS core collection database shows a total of 45 documents published between 2020 and 2021. After refining the research areas, we obtained 28 papers for this study.

The increase in publishing activity over the last two years may indicate the emphasis that firms have on risk management and sustainable development goals in the face of the COVID-19 pandemic to decrease the risk impacts of COVID-19 and accidents and professional diseases. Our results publication numbers are summarized as 8 articles in 2020 (28.57% of the total articles), and 20 articles in 2021 (71.43% of the total).

Table 1 presents the most productive research areas of WOS on risk management, sustainable development goals, and COVID-19. "Environmental Sciences Ecology and Science Technology" are the category with a major number of publications (32.14%).

Table 1: The most productive areas of research on risk management, sustainable development goals, and COVID-19

No.	Area of research	Number of publications	% of all articles
1	Environmental Sciences Ecology	9	32.14%
2	Science Technology Other Topics	9	32.14%
3	Business Economics	7	25.00%
4	Engineering	3	10.71%
5	General Internal Medicine	3	10.71%
6	Health Care Sciences Services	2	7.14%
7	Public Environmental Occupational Health	2	7.14%
8	Management	2	7.14%
9	Engineering Industrial	1	3.57%
10	Engineering Manufacturing	1	3.57%
11	Engineering Multidisciplinary	1	3.57%
12	Engineering Environmental	1	3.57%

Table 2 presents the most productive countries publishing on risk management, sustainable development goals, and COVID-19. of 53 different countries, out of those 25, 11 are located in Europe, 7 in Asia, 3 in Africa, 2 in Australia, and 2 in North America.

Table 2: Countries publishing on Risk management, sustainable development goals, and COVID-19

Countries	(%) publications	Countries	(%) publications
ENGLAND	25%	EGYPT	7.14%
PEOPLES R CHINA	21.42%	ETHIOPIA	7.14%
AUSTRALIA	14.29%	FINLAND	7.14%
USA	14.29%	HUNGARY	7.14%
FRANCE	10.71%	IRAN	7.14%
INDIA	10.71%	ITALY	7.14%
MALAYSIA	10.71%	NEW ZEALAND	7.14%
SOUTH KOREA	10.71%	PAKISTAN	7.14%
BANGLADESH	7.14%	POLAND	7.14%
BELGIUM	7.14%	RUSSIA	7.14%
CANADA	7.14%	SCOTLAND	7.14%
DENMARK	7.14%	SOUTH AFRICA	7.14%
SPAIN	7.14%		

The institution with the most papers is the Indian Institute of Technology System (IIT System), which has three publications (see Table 3). Universities have the highest number of publications, approximately 78 % of the overall numbers of institutions participating in the whole research (28 researches).

Table 3: The most productive institutions publishing on risk management, sustainable development goals, and COVID-19

Institutions	Country / Region	Number of publications
INDIAN INSTITUTE OF TECHNOLOGY SYSTEM IIT SYSTEM	India	3
ADDIS ABABA UNIVERSITY	Ethiopia	2
BANGLADESH RURAL ADVANCEMENT COMMITTEE BRAC	Bangladesh	2
EGYPTIAN KNOWLEDGE BANK EKB	Egypt	2
HARVARD UNIVERSITY	Cambridge (USA)	2
MINISTRY OF HEALTH MEDICAL EDUCATION MOHME	Iran	2
STANFORD UNIVERSITY	California	2
TEHRAN UNIVERSITY OF MEDICAL SCIENCES	Tehran (Iran)	2
UNIVERSITY OF ALABAMA BIRMINGHAM	Birmingham (Alabama)	2
UNIVERSITY OF ALABAMA SYSTEM	Tuscaloosa, Alabama	2
UNIVERSITY OF CALIFORNIA SAN FRANCISCO	San Francisco (California)	2
UNIVERSITY OF CALIFORNIA SYSTEM	California	2
UNIVERSITY OF CAMBRIDGE	United Kingdom	2
UNIVERSITY OF CENTRAL PUNJAB	Pakistan	2
UNIVERSITY OF EDINBURGH	Scotland	2
UNIVERSITY OF GONDAR	Ethiopia	2
UNIVERSITY OF LINCOLN	Lincoln (England)	2
UNIVERSITY OF MINNESOTA SYSTEM	Saint Paul (Minnesota)	2
YONSEI UNIVERSITY	Seoul (South Korea)	2
A T STILL UNIVERSITY OF HEALTH SCIENCES	Kirksville (Missouri)	1
AARHUS UNIVERSITY	Denmark	1

4. Discussion

The researchers present a summary and discussions of the articles which explain the effect of COVID-19 on various SDGs and risk management.

First of all, the main SDG affected directly and strongly by COVID-19 is “Good health and well-being”. According to Ashford et al. (2020), COVID-19 has effectively demonstrated the disparities and healthcare issues that the SDGs are meant to address. The COVID-19 pandemic demonstrates that sustainable development extends beyond national policies. Every individual must make health decisions that address both personal and communal requirements, such as wearing face masks on public transportation, following social distancing guidelines, and self-quarantining as necessary. Such actions can assist in limiting disease transmission as well as illness, fatalities, and economic costs. Consequently, Covid-19 confirmed that any initiative or project that is not covered by the SDGs would be canceled (Layton et al., 2021). SDGs offer societies a realistic framework for navigating through and beyond the COVID-19 pandemic. However, the SDGs for occupational health and safety is not without problems either as progress toward the SDGs had been too sluggish even before the outbreak (Butcher, Acuto & Trundle, 2021).

Moreover, the SDGs that have received the most attention include good health and well-being (Daher-Nashif & Bawadi, 2020). Due to COVID-19, which was a crisis, overhead costs increased, such as site management costs and costs incurred as a result of steps taken to keep the facility secure during lockdown (safe working environment for stakeholders). The productivity of projects impacted by labor constraints and material supply limitations during lockdown needs collaboration across project teams to offer clear guidance on the likely consequences on delivery timelines. Delays in completion (where impacted activities are on the critical route) and increased costs for an out-of-sequence activity to recoup program delays in job planning are the most important risks that need a strategic plan to decrease this risk on projects (Jallow, Renukappa & Suresh, 2020). The infrastructure budget was also increased as part of realistic measures to guide the post-surge recovery period towards achieving the SDGs (Ebekozi, Aigbavboa & Aigbedion, 2021).

Furthermore, other articles have shown that there are SDGs that examine the influence of official development aid (ODA) on health outcomes (Cha et al, 2017). Nonetheless, the SDGs are important for everyone concerned with health, justice, and development since they will likely decide the direction and degree of financial commitment for global health programs over the next 15 years in an environment where ODA plays a declining role (Caprani, 2016). Indeed, the SDGs' experience reveals that health and safety regulations are concerns that do not feature in the targets (Kumi, Yeboah & Kumi, 2020).

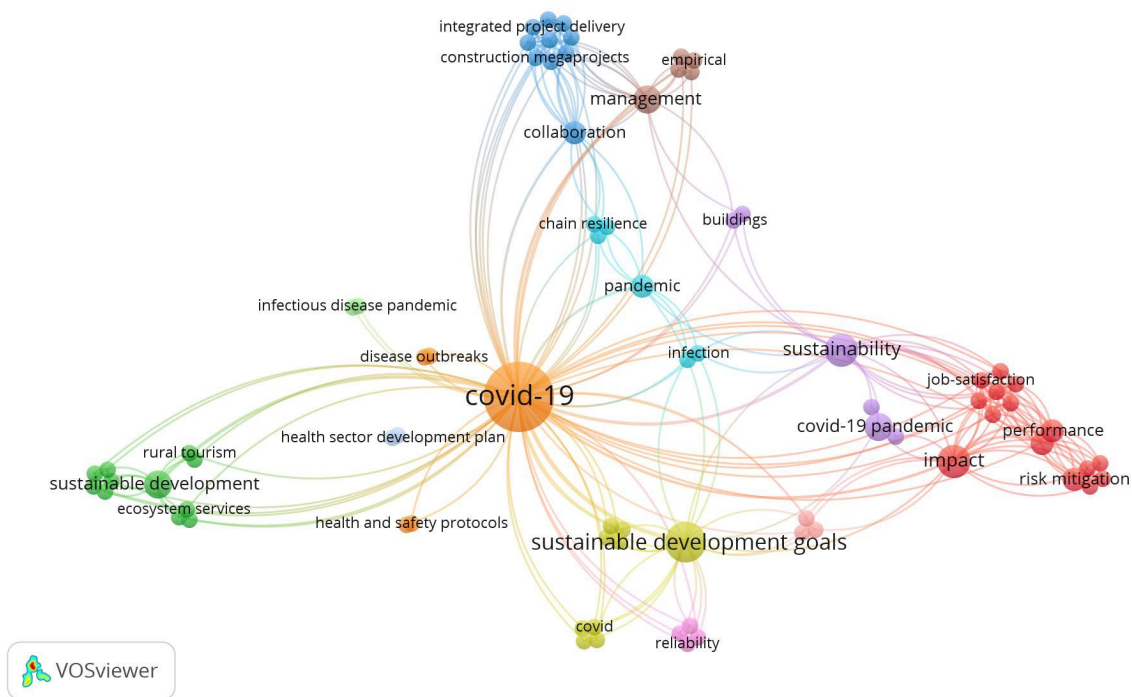
On the other hand, the COVID-19 affected directly and strong risk management, as several articles show. The COVID-19 pandemic had a variety of detrimental consequences on individual insurance product claims ratios, creating major changes in the perception, evaluation, and scope of insurance risk (Richter & Wilson, 2020). The emergence of the COVID-19 pandemic, the freezing of economies, decreased earnings, and job losses are all elements that have a significant impact on the structure of price risk (Korzeb & Niedziółka, 2020). Weakened creditworthiness affects both loans taken out before the COVID-19 pandemic and loans applied for by potential borrowers to compensate for previously unexpected losses in earnings following the pandemic's outbreak (Kozak, 2021).

In addition, some researches show that countries with aging populations are more exposed to COVID-19, and host the most international travelers. It also analyses that the aging population and its interaction with people exposed to air pollution are vulnerable to COVID-19 but marginally lesser than the former. However, their behavior varies from country to country, making room for future studies to develop a more in-depth analysis. It gives a different dimension to consider other risk factors of COVID-19 by bearing in mind its unique contagious

used keyword was "COVID," the second most frequently used word was "health," and the third most frequently used phrase was "risk". The word cloud displays words in varying sizes based on how many times they appear. The word arrangement is relatively random; however, the dominant words are positioned in the center to be more noticeable due to their huge size (Rusydiana, 2021).

Figure 2 describes the key trends on risk management, sustainable development goals and covid-19 disciplines and identify potential research areas. For this purpose, a co-occurrence analysis is performed to recognize linkages between topics and emerging areas of study (Al-Zaman, 2021; Kraus et al., 2020). The key terms of the 28 data collected from WOS core collection data base were analyzed using VOSviewer software which is a software for creating and displaying bibliometric networks. These networks can be built via citation, bibliographic coupling, co-citation, or co-authorship relationships, and can comprise journals, researchers, or individual articles to grasp the research areas.

Figure 2: Co-occurrence of keywords network visualization map on risk management, SDGs and COVID-19



It is a very valuable method for estimating the number of times a keyword is repeated, as well as for determining the strength of links between keywords. The clusters of keywords are represented by circles, while the linkages between these clusters are shown by lines. In general, a shorter distance reflects a stronger relationship. We apply a cluster analysis based on the co-occurrence of keywords in the data. Seven distinct clusters have been identified, which represent the major research trends. These clusters were detected and classed based on the number of linkages and the strength of those links. Finally, from 234 key-words, 43 meet the threshold. Seven different clusters, 131 links and 144 total link strengths have been obtained.

Keywords on the center of the map (Figure 2) represent a higher relation, while those on the edges of the map, indicate lower relations. In this study, cluster 1 has 12 items; cluster 2, 10 items; cluster 3, 7 items; cluster 4, 6 items; cluster 5, 3 items; cluster 6, 3 items and cluster 7,

2 items. As shown in Figure 2, the nodes' colors represent different clusters, and also the circles' size represents the frequency. The cluster colors are shown in blue, red, green, yellow and purple. Generally; the terms within the red cluster are largely researches on the COVID-19 and sustainable development goals. "COVID-19" is that the central term cluster; closely related terms include "sustainable development goals", "management", "construction project", and "health and safety protocols". The green terms within the second cluster are associated with the sustainability. The blue cluster composes the COVID-19 in management. Some items from this group included "building". The purple cluster shows the relation between COVID-19 and sustainable development goals (Ninglasari, 2021).

5. Conclusion

This study serves as a preliminary platform for future research exploring the impact of COVID-19 on risk management and SDGs in depth. It explored the harmful effect of COVID-19 on several categories in different countries. The findings indicate that the SDG most directly and strongly affected by COVID-19 is "good health and well-being". In addition, overhead costs increased during the pandemic, such as site management costs and the costs of measures taken to maintain site safety during the closure. It also affected risk management factors, such as age and co-morbidities, which influenced the number of deaths.

The content analysis was applied to the identified articles to describe the influence of COVID 19 on risk management and SDG's in different fields. In addition to WOS, we recommend using other databases to get as many researches as possible, which will increase the usefulness of the analysis result. An intriguing future research direction would be to consider the use of practical guides, training, and specialized books to obtain a more comprehensive perspective of the impact of COVID-19 on risk management and SDGs related to construction management to avoid the negative effects of COVID-19 on the project plan implementation.

Our paper has several limitations. The number of articles analyzed was limited because the COVID-19 was just introduced to the globe in the last two years. The coronavirus's influence on all aspects of life continues to this day. As a result, it is critical to monitor its evolution to gain a clear picture of the virus's most serious consequences and how to combat them.

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