COVID-19 EFFECTS ON THE ENVIRONMENTAL PRACTICES IN THE HOTEL INDUSTRY, REVIEW ARTICLE AND MANAGERS' POINTS OF VIEW

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Summary

COVID-19 had its major effects on each aspect of life, that forced the humanity to modify and upgrade. It also showed that the harmful effects of human activities on the environment could be reduced and eliminated if they take serious steps. The effects of the hotel industry forced it to adopt green practices and upgrade them to reduce the negative effects of COVID-19 on the industry and even gain some competitive advantages and profits. This paper aims to analyze the positive/negative effects of COVID-19 on green practices within the hotel industry, in order to generate some useful lessons for the future or coming crises. This study depended on a mixed method to analyze this issue, a systematic review technique to analyze the scientific productions in this area, and then conduct interviews with managerial in green hotels to combine results. A total of 50 articles were extracted from the "WoS" database and analyzed using three main analysis levels. This study revealed that: (i) COVID-19 had a positive effect on green practices including the hotel industry and also some negative effects, those effects had be summarized into six main groups; (ii) green practices were able to reduce the negative effects of COVID-19 on the hotel industry; (iii) green practices generated a competitive advantage even in the darkest time. (iiii) The upgrade and increase of green practices in the hotel industry continue even after the risk of COVID-19 declined.

Keywords: *COVID-19, coronavirus, green practices, environmentally friendly, the hotel industry, negative, positive*

JEL: *H12, P48, Q5, Z32*

Introduction

Till today, Human activities have left a major severe imprint on the environment, such as the huge increase in pollution rates, global warming, climate change, snow melting, and ecological life as a result of transportation systems, industries and their waste, population growth, wars, and many other factors (Hameed, Hussain and Khan, 2021; Babeú-Bolyai University, Cluj-Napoca, Romania *et al.*, 2022). This has forced most countries to move seriously and take serious measures and establish laws and regulations to protect the environment to prevent or minimize the negative effects of human activities (Alreahi, Bujdosó, Dávid, *et al.*, 2023; Alreahi, Bujdosó, Kabil, *et al.*, 2023, Gyurkó - Gonda, 2024). In addition, several international conferences, such as the Paris Conference, emerged as international agreements for environmental protection. The United Nations formulation of the Sustainable Development Goals (SDGs) emerged as a global framework geared towards protecting different resources and reducing the carbon footprint (Hameed, Hussain and Khan, 2021). Moreover, many civil movements have been established to protect the environment, the most important of which is the Green Party movement. These movements come as a social and even individual reaction to confront environmentally harmful practices and as a fear of the coming future (Khan and Hameed, 2019; Moise *et al.*, 2019). Thus, the environmental problem has become a real threat and a serious issue facing humanity and requires everyone to unite and unify

their efforts effectively on a global scale to reach and achieve the desired results (Babeú-Bolyai University, Cluj-Napoca, Romania *et al.*, 2022; Syariati *et al.*, 2023).

As one of the most considerable economically important industries at the global level and the fact it is the backbone of the economy of many countries (Tarigan, Tanuwijaya and Siagian, 2020; Alreahi, Bujdosó, Dávid, *et al.*, 2023), the hospitality industry has been one of the most important and fastest growing industries globally in recent decades (Prakash *et al.*, 2022), due to the significant increase of the of tourists' number as a result of globalization, but this, in turn, has had its negative impact on the environment, as the hospitality industry is considered as one of the industries with a significant harmful impact on the environment. It is classified as one of the industries with intensive consumption of energy and resources and food waste, and its contribution to carbon emissions reaches 8% globally (Al-Aomar and Hussain, 2017).

As a pivotal part of the hospitality industry, the hotel industry is the main pillar of the hospitality industry and tourism support (Tarigan, Tanuwijaya and Siagian, 2020). This sector has witnessed significant growth in the past decades as a result of the significant increase in the number of tourists and thus the increasing demand for accommodation, entertainment and various other activities provided by hotels and their different facilities depending on their size, class, and star-rates (S.W.Chan and H.C. Hsu, 2016; Prakash *et al.*, 2022).

This in return has put the hotel industry under great pressure to start taking serious actions to mitigate its negative impact on the environment, as it is directly responsible for many environmental issues as a result of the practices it carries out in its traditional form. the most important of which is the excessive use of water, which has reached up to 5% of the global consumption (Sorin and Sivarajah, 2021), in addition to energy consumption, waste production and food waste (Singh, Cranage and Lee, 2014; Gautam, 2021), where the hotel industry's carbon footprint has reached 1% globally (Alreahi, Bujdosó, Dávid, *et al.*, 2023).

Nowadays, guests' preferences for green and environmentally friendly accommodations have begun to increase until it has become essential to meet these preferences, otherwise a large segment of tourists will be lost (Berezan, Millar and Raab, 2014; Zhang *et al.*, 2022). The main competition factors i.e., quality, price and location are no longer enough in the growing global openness and globalization, but rather green services have become a new element of competition and an additional point in favor of those who apply them to outperform the traditional form (D'Souza, Taghian and Lamb, 2006; Flejszman, 2009; Zeng *et al.*, 2011; Jian *et al.*, 2020).

A green hotel could be defined as a hotel that engages and performs more environmentally friendly practices as an ongoing and continuous effort to preserve natural resources (Gallego-Álvarez, García-Sánchez and da Silva Vieira, 2014; Zhang and Xie, 2021; Choirisa, 2022). This can be done through an effective environmental system which works to regulate consumption, recycle and reduce waste, and reduce the carbon footprint (2020). Therefore, the application of environmental management systems by hotels will not only improve environmental performance, but it will have a positive impact on the financial performance of hotels due to the improvement in operational performance and the reduction of costs, waste and consumption of resources used (Yenidogan, Yenidogan and Tetik, 2021; Hasan and Rahman, 2022; Zhang, Chang and Wu3, 2022).

In general, hotels that adopt environmental management systems in their business have achieved a better reputation, value and image among customers, moreover, reaching and enhancing a higher level of customer satisfaction and loyalty, which has been increasingly reflected in customers' preferences (Han, Hsu and Lee, 2009; Constantin, Ispas and Candrea, 2013; S.W. Chan, 2013). Thus, the transformation of green hotels increases the level of competitive advantage and includes in its content many details and points (Hameed, Hussain and Khan, 2021).

At the end of 2019 and the beginning of 2020, the Coronavirus took center stage as the greatest challenge humanity has faced this century (Khan *et al.*, 2021), imposing what can be likened to the biggest threat of the century and the most serious global health emergency situation (Gupta and Sahu, 2021). It led to catastrophic results and consequences not only on human lives but also on economic, financial and social systems all around the world (Kuo, 2021), and with regard to the tourism and hospitality sector in particular, it received a strong hit that could be described as collapse and a struggle for survival (GUEVARA, 2020; Ņikadimovs and Rodčenkova, 2021). The measures and Precautions imposed by governments and countries to contain the pandemic, such as partial or full closedown, social distancing policies, travel restrictions, and border closing have had devastating effects on the hospitality sector (Allmen *et al.*, 2020; Polemis, 2020; Gautam, 2021; Zhang, Chang and Wu3, 2022). As for the hotel sector, it was not only a violent shock, it revealed that this industry has a fragile nature (Ozdemir *et al.*, 2021). In addition to putting more than 50 million jobs on a stick all over the world (Choirisa, 2022). the rates of reservations and occupancy declined and revenues decreased unprecedentedly, where this decline reached 90% for Marriott hotels in the Chinese market for the year 2020 (Choirisa, 2022), in addition to a decline in hotel profits in the United States, the Middle East, Asia, and Europe, which sometimes reached 100% annually (Simon, 2020).

There is no doubt that the coronavirus has had a tremendous negative impact on human life and living systems in general and the economy in particular (GUEVARA, 2020; Khan *et al.*, 2021; Kuo, 2021), but it is noteworthy that the restrictions imposed by actions to limit the spread of the virus infections inflation also had some positive impacts, specifically on the environment and environmentally friendly activities (Hoang, Truong and Nguyen, 2021; Jafari, Özduran and Saydam, 2021), as the percentage of emissions resulting from transportation systems decreased by up to 17% in China and Europe (Abdallah M. Elshaer *et al.*, 2022). transportation systems by up to 17% in China and Europe (Abdallah M. Elshaer *et al.*, 2022), this decline in tourist demand and excessive tourism led to a return to positive results and recovery in natural and wildlife systems (Abdallah M. Elshaer *et al.*, 2022). Moreover, the focus of tourists is no longer on the high level of luxurious services, but rather on the level of safety and protection from the virus had become the most important (Gupta and Sahu, 2021; Abdallah M. Elshaer *et al.*, 2022). At the same time, however, the situation imposed an insane use of cleaning and sterilization materials, the use of disposable plastic products, and the wrapping of everything that could be wrapped in plastic, which had a negative environmental impact on aquatic life and nature and increased the amount of plastic and medical waste which requires special treatment (Filimonau, 2021; Mehta and Sharma, 2021; Saepudin and Putra, 2023).

As for tourists and hotel guests, the trend has increased towards certain types of tourism and thus the revitalization of related hotels, the most important of which are ecotourism and rural tourism (Hasan, 2022; Marco-Lajara *et al.*, 2022), as they are available and located in more isolated areas and provide better air, which significantly reduces the possibility of being infected with the coronavirus (Marco-Lajara *et al.*, 2022).

This has alerted humanity and drawn its attention to the importance of environmental protection and that change is still possible if we take serious steps regarding environmental protection (Šerić and Šerić, 2021). Many hotels moved forward to adopt more social responsibility and sustainability programs as an opportunity to take a serious step to ensure the sustainability of their business through sustainability (Alsetoohy *et al.*, 2022).

In this context, this study attempts to form a general idea about the impact of the Coronavirus on environmentally friendly practices in the hotel industry sector, by presenting the positive and negative effects of COVID-19 on environmental activities in the hotel industry and dividing them into a set of main groups and discussing them. Since all studies focused on business sustainability

or social sustainability, no study was found that addressed that impact on environmental practices in a comprehensive and integrated way. The fact that it is necessary to summarize what has been published to form a conclusion that can be used as one of the learned lessons from the crisis created by the Coronavirus.

This paper will attempt to answer the following questions:

1- What is the current state of scientific publishing regarding the effects of COVID-19 on environmentally friendly practices in the hotel industry?

2- What is the attention and discussion level of the effects of the Coronavirus on environmental practices in the hotel industry, and how was the cooperation in this field?

3- What are the positive/negative effects of the Coronavirus on environmental practices in the hotel industry that were extracted, mentioned or addressed from previous scientific publications?

4- What is the opinion of hotel managers about the effects of the Coronavirus on environmental practices in the hotel industry, according to their personal experience?

In this study, a mixed approach will be adopted to summarize the effects of the Coronavirus on environmentally friendly practices in the hotel industry. The first method will be using (systematic review), and the second will be by summarizing several interviews that the researcher conducted with some hotel managers in Budapest city, where this city is considered one of the most important tourist cities in the world, which, like other tourist capitals, has suffered from the repercussions of the Coronavirus.

The study will begin with an introduction, which will present a comprehensive overview of the environmental repercussions and the importance of the hospitality and hotels sector, in addition to the hotel sector's impact on the environment, and how protecting the environment has become an essential factor to ensuring continuity and resilience in this industry. Then the impact of the Coronavirus on human life, tourism, and the hotel industry will be briefly mentioned.

This will be followed by the Materials and Methods section, where the method of collecting data will be explained in addition to the different levels of analysis that were adopted and used in this study.

In the results section, clear results and an explanation of the different levels of analytical units will be presented, in addition to providing the justification and importance of conducting these analyses.

In the Discussion section as final section, a discussion of the impacts of the Coronavirus on environmental practices in the hotel industry will be presented which was drawn from previous literature and compared with the findings drawn from the interviews conducted, followed by the Conclusions, Implications and Limitations section of this study.

Material and method

In order to create a coherence review of scientific literature, the PRISMA model has been used as one of the most considered models to collect scientific data, eliminate and select which records are related or not (Page *et al.*, 2021; Kabil *et al.*, 2022). Next, details of selected scientific recodes have been organized by conducting a multi-level analysis, aiming to present a comprehensive systematic review. Results have been presented in shapes, graphics and tables (Kabil *et al.*, 2021; Alreahi, Bujdosó, Kabil, *et al.*, 2023), based on the bibliometric analysis which has been chosen as one of the highly recognized methods in quantitative analysis for scientific papers (Alreahi, Bujdosó, Dávid, *et al.*, 2023).

Several interviews were also conducted with managers in some hotels in Budapest city the capital of Hungary. The selected hotels had officially adopted green practices and environmental management systems. The interviews aim to present their point of view based on their personal experience during the coronavirus outbreak, as a means of enriching the scientific content and fortifying the results reached and discussing it in a more in-depth, detailed and accurate way.

Data Collection

The systematic review's first step is to start with the data-collecting process. To initiate this step, the time scope should be defined with a reasonable justification based on scientific facts.

In the case of this review article, the Coronavirus began at the end of December 2019 and began to spread globally from the beginning of 2020 (Ņikadimovs and Rodčenkova, 2021; Elkhwesky *et al.*, 2022; Johann, 2022). With the availability of vaccines and the ability of humanity to regain control, countries began to break the state of lockdown in the year 2021 (Liu and Yang, 2021; Chen and Peng, 2023), However, to this day, according to "World Health Organization" statistics (2024), the virus is still active and records new infections every day, but what is important is the general closedown that occurred and struck all parts of the world. Based on the above, the beginning of the scope of identifying articles was determined from 2020, and the end of the research period was determined by the end of 2023, this means that the comparison will be made on an annual basis, knowing that articles are still being produced regarding COVID-19 until today, but the comparison will not be fully effective or clear until at least the end of half of the year 2024 to be able to compare what was produced in this year. Another problem is the delay in publishing the appearance of some scientific publications at times. In this study, the search for publications was conducted by the end of March of the year 2024 for publications from the beginning of 2020 and the end of 2023, to ensure that all publications from 2023 appear.

The Web of Science (WoS) database was selected as one of the most important and reliable scientific research databases, this scientific database contains more than 171 million scientific records and more than 34,000 indexed journals (Elkhwesky *et al.*, 2022). Moreover, this database is widely used for performing Systematic Reviews, Meta-Analysis and Bibliometric Analysis, it provides detailed search options and the possibility of using special search algorithms (Elkhwesky, El Manzani and Salem, 2022; Alreahi, Bujdosó, Dávid, *et al.*, 2023).

The algorithms for the research were carefully formulated clearly and simply to ensure that all relevant scientific records are accessed and included in the result, as the study includes hotels and environmental practices, and the word "sustainable" or "sustainability" was used because environmentally friendly practices are also known as environmental sustainability practices and also known as green practices. The virus is mentioned by several names and forms that were mentioned in the research formula.

Research algorithm:

("COVID-19" or "corona*" or "covid*") and "hotel*" and ("environment*" or "sustainability" or "sustainable*" or "green*")

The search was done within the scope of (topic), which includes both the title of the scientific records, the abstract and keywords. As a result, 327 relevant scientific records were obtained, and then filtering was performed to exclude irrelevant records. First, 9 records were excluded because they were in a language other than English (4 Spanish, 3 Portuguese, 1 Catalan, 1 Polish). Then the first round of scanning was performed, which excluded articles that dealt with environmental topics but were not related to the hotel industry or that the word hotel was mentioned casually in the

abstract, thus excluding 187 scientific records. After that, the second round of screening was carried out, which was more detailed and in-depth, as another 81 scientific records were excluded, as these records addressed sustainability in the hotel industry but only talked about social or economic sustainability, business sustainability, or tourism industry in general, but did not address environmental sustainability and were therefore excluded. As a result, 50 scientific records were retained that dealt with environmental practices or environmental sustainability and the effects of the COVID-19 pandemic on them. Table (1) shows the steps and details of the filtering and screening process.

Table 1. Summary of the criteria used in refining and organizing the systematic literature review records

Stage	Steps	Description	Records No.
Collection	Data collection	WoS database	327
Refinement	Records languages	Keep only English records	318
	Data screening-1	Extract articles and remove non-related records to the topic	131
	Data screening-2	Categorize articles based on their relevance to the study purpose and objectives	50
Organizing	Analyse, organize and categorize	Analyse related records and organise the information into main categories	50

Source: by authors (records selection steps/Table 1)

Between December 2023 and April 2024, 6 interviews were conducted with managers from several eco-friendly hotels in Budapest, their management positions varied, including two general managers, a deputy general manager, a public relations manager, a maintenance and sustainability manager, and a reception manager. The categories of hotels where these managers work also varied, three managers are working in 5-star hotels, two in 4-star hotels, and one in a 3-star hotel. The managers preferred to keep the information anonymous because some of the points discussed had a negative impact on the hotel's work from an environmental point of view due to the necessity of dealing with the coronavirus.

The nature of the interviews varied: two interviews were conducted in personal meetings, while the remaining four interviews were conducted via video meetings. The duration of the interviews ranged from 30 to 45 minutes. Environmental practices and their current situation were discussed. In addition to the effects of the coronavirus on these environmental practices in the hotel industry, how they dealt with its effects, and what lessons were learned from the experience they went through. The Coronavirus discussion included the following topics:

1- How has the coronavirus affected the environmental practices in the hotel where you work, either positively or negatively?

2- What practices have been taken to mitigate the impact of the virus on environmental practices while ensuring the same level of service and health protection?

3- What procedures or modifications did the coronavirus impose on the nature of work in the hotel, and what procedures were maintained even after the threat had passed?

4- What are the updates on environmentally friendly practices that the Coronavirus has highlighted the importance of and which you have implemented or will implement?

Analysis Levels

In total, three levels of analysis were conducted for the scientific records that matched the topic of the study, namely, basic information analysis, basic content analysis, and deep content analysis. These three levels of analysis include nine different units of analysis, each analysis addresses a specific aspect or part of the scientific record. The basic information analysis level includes four different analyses i.e., Scientific Production Analysis, Source Analysis, Record-Type Analysis and Field-of-Study Analysis. The basic content analysis also includes four different analyses i.e., Study Sample Level/Type Analysis, Country Case Studies, Keyword Analysis and Authors and Collaboration analysis. The deep content analysis includes one analysis, but it is the most important of the three, and it is where the conclusion of the study lies (see Table 2.).

Each analysis level provides an answer to one or more of the research questions. The first level aims specifically to answer the first question and the second question partially. The second level of analysis answers the second question specifically and the first question partially. The third level of analysis is dedicated to answering the third question, where the positive and negative effects of the Coronavirus on environmental practices in the hotel industry will be presented, whether positively or negatively. It is also the focus to guide the writing of the discussion and the comparison with the views of managers, including the similarities and differences that exist, and thus It is important to answer the fourth question adequately. The fourth research question will be answered by summarizing the points extracted from the interviews with hotel managers and presenting them in the discussion section.

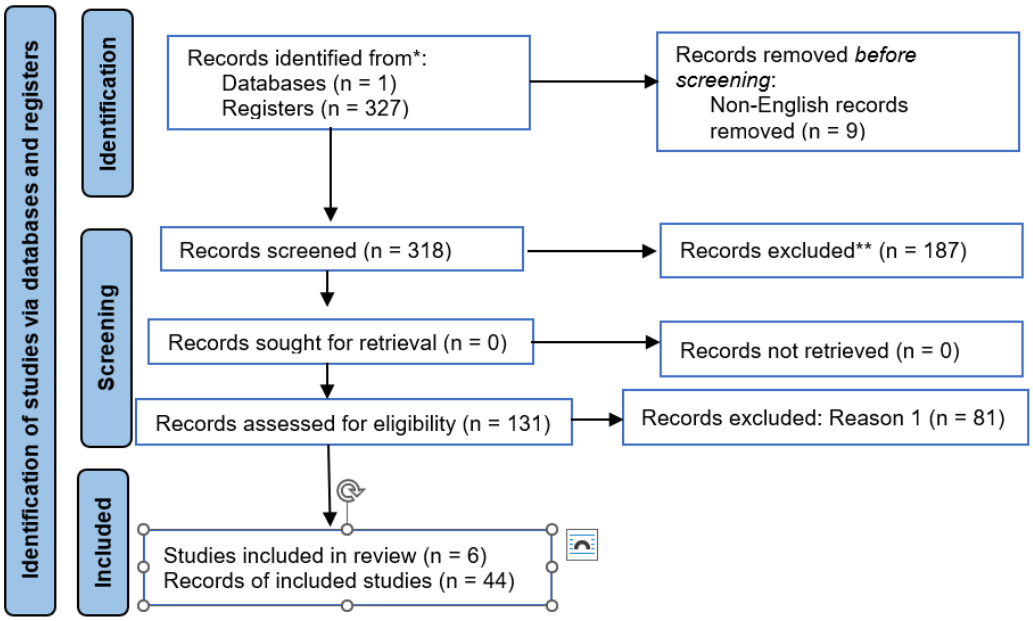
Table 2. Systematic review levels of analysis and units of analysis.

Level of analysis	Unit of analysis
Basic information analysis	Scientific Production Analysis
	Source Analysis
	Record-Type Analysis
	Field-of-Study Analysis
Basic content analysis	Study Sample Level/Type Analysis
	Country Case Studies
	Keyword Analysis
	authors and Collaboration analysis
Deep content analysis	COVID-19 effects of green practices in the hotel industry.

Source: By authors (Sys-review analysis/Table 2)

Results

The process of data collection has been applied following the PRISMA (Preferred Reporting Items for Systemic Reviews and Meta-Analyses) process (Page *et al.*, 2021); Figure 1. represents a diagram which shows the method of selecting literature in this study. In general, it starts with the data extraction from the selected database (WoS), moving to the screening and filtering step, in this study multiple screening and refinement were applied, to end with a total of 50 scientific documents which have met the study topic.



* Web of science (n= 327).
** (n= 187) records were excluded by a human.

Figure 1. PRISMA flow diagram for the literature selection process.
Source: Authors, Prisma working flow

The Basic Information Analysis Level

This analysis level is based on general information about the selected records, four sub-level analyses will be presented next which are: Scientific Production, Source, Record-Type Analysis, and Field-of-Study.

1. *Scientific Production Analyses*: the emergence of COVID-19 started at the end of December of 2019 and started to cross countries borders in 2020 (Ņikadimovs and Rodčenkova, 2021; Elkhwesky *et al.*, 2022; Johann, 2022), this justifies why the scientific publications related to the research topic were too low in 2020 where N=2, but when the risk and effects of COVID-19 became a very serious issue, this topic became more interesting, as in 2021 where N=9. And by 2022, and 2023, humanity started to adapt to the situation, and many countries broke the lock-down situation and proceeded forward again to live a normal life (Liu and Yang, 2021; Chen and Peng, 2023). The interesting thing is even after 2 years of the lockdown breaking, the case of COVID-19 is still interesting for the scientific community, where they are trying to analyze and extract more information and results of the COVID-19 case. The number of selected records which met the research criteria is N=50. It is not a small number while other reviews which studied COVID-19 but in different areas of study had a selected scientific records' number which ranged from 40 up to 60 (Ņikadimovs and Rodčenkova, 2021; Alsetoohy *et al.*, 2022; Elkhwesky, El Manzani and Salem, 2022; Elkhwesky *et al.*, 2022; Johann, 2022; Li *et al.*, 2023).

Figure 2. shows the related scientific publications related to the research topic from 2020 till 2023.

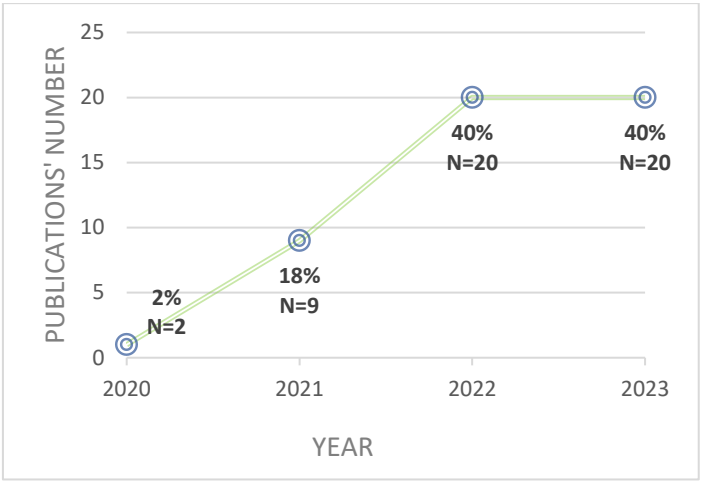


Figure 2. Publications' numbers and the distribution yearly.

Source: authors- based on R results

2. *Source Analysis*: the selected scientific records had been published in 33 different scientific journals in total. This refers to the importance of this research topic and the interest of it from many publishers. Table 3. presents the top 10 publishers on the topic, where the 23 other publishers have published one scientific record only each. Sustainability Journal is the top publisher in the list with 9 scientific records, whereas the other 9 journals published 2 articles each regarding the effect of COVID-19 on environmental practices in the hotel industry.

Table 3. Top 10 scientific journals publisher for the research topic

City name	NP
SUSTAINABILITY	9
ADVANCES IN TOURISM, TECHNOLOGY AND SYSTEMS, VOL 2	2
CURRENT ISSUES IN TOURISM	2
INTERNATIONAL JOURNAL OF HOSPITALITY & TOURISM ADMINISTRATION	2
INTERNATIONAL JOURNAL OF TOURISM CITIES	2
JOURNAL OF HOSPITALITY & TOURISM RESEARCH	2
JOURNAL OF HOSPITALITY AND TOURISM INSIGHTS	2
TOURISM AND HOSPITALITY MANAGEMENT-CROATIA	2
TOURISM MANAGEMENT PERSPECTIVES	2
WORLDWIDE HOSPITALITY AND TOURISM THEMES	2

Source: authors- NP (number of publications)

3. *Record-Type Analysis:* the record-type analysis is considered important because it shows what type of articles have been written and what are their type. Where the original articles or in other words the original research article bring new studies and give a new scientific result, while the conceptual article tries to solve a problem using new concepts. As for the review article, it tries to summarize the scientific publications from a certain issue in order to present new ideas and results from a certain point of view. In the case of COVID-19 effects on green practices in the hotel industry, 43 original articles met the search criteria, one conceptual article, and six review articles (please see Figure 4.). This also reflects the importance of the topic due to the variety of publication types.

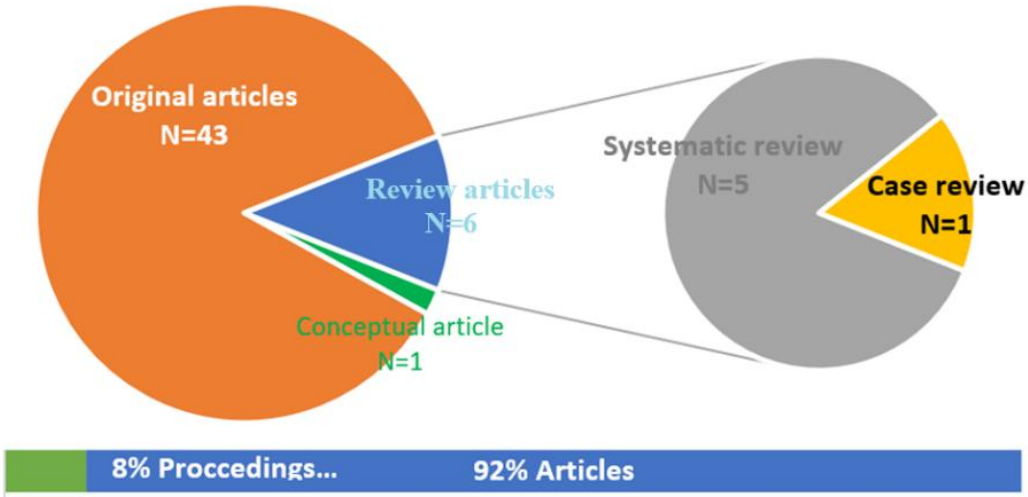


Figure 4. Published records based on article type.

Source: authors

4. *Field-of-Study Analysis:* field of study analysis is important because it shows the variety of relations between the research topic and scientific fields of study. The effects of COVID-19 on green practices in the hotel industry have a wide relation with scientific fields, this can be justified because of the relation of green practices with different aspects of study or fields. Moreover, it is important to reveal how COVID-19's effects were wide. Figure 5. shows the selected publications' scientific fields, 42% of publications were about the hospitality industry and tourism due to the relation with the hotel industry. The more interesting appearance is the urban study, finance, technology, computer science, energy and fuels, studies related to those fields would present unusual and the most interesting results.

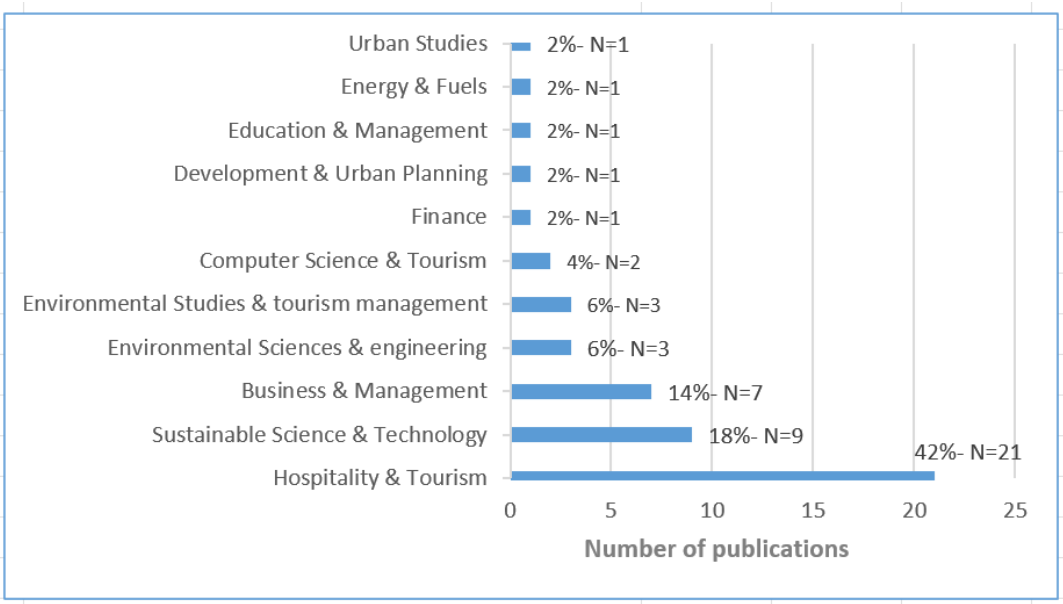


Figure 5. Published scientific records' field of study.

Source: authors

Basic content analysis

This analysis aims to present more detailed information about the selected records, as a try to dive further into details. It will contain four different sub-level analyses, starting with both sample level and study type analysis, country case study analysis, keywords analysis, and finally, the authors and collaboration analysis.

Study Sample Level/Type Analysis (method): it is highly important to know and understand what are the main groups that have been studied and focused on in the articles' studies. When the segments or groups differ, it means that the selected topic is important, sensitive and major to be discussed with those different segments and from different points of view. Regarding the effects of COVID-19 on green practices in the hotel industry, the selected segments differed, and there were five different segments, Figure 6. shows the selected articles' studies segments and the percentage of each one. Customers ranked first with 41%, secondly managers with 23% followed by the employees with 16%, and finally as an independent segment comes hotels with 14%. Three studies had a double segment, which will add the fifth type of segment i.e., Owners.

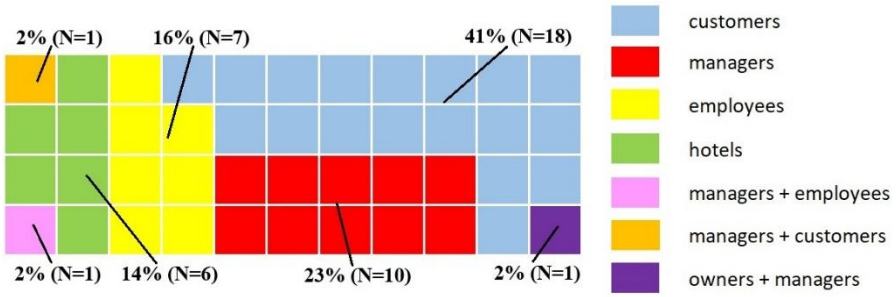


Figure 6. Published articles studies' sample/ segment.

Source: authors

Studies analysis method also differs between studies, this variety is important because each method is important to deal with different cases and deal with different sample types, intending to address different feedback and results. This also gives a sign of the topic's importance level and how rich it is. As for this study topic, five main study types have been applied, i.e., quantitative, qualitative, review, conceptual, and mixed. Figure 7. presents a clear view of each method with its percentage.

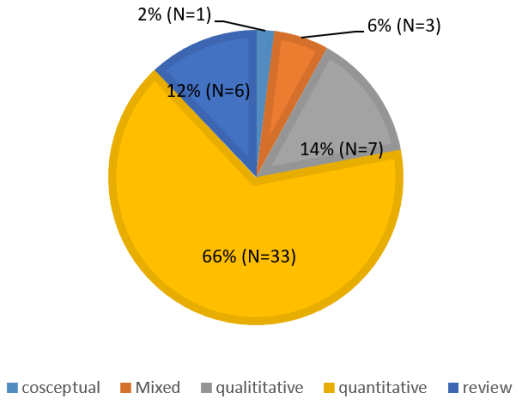


Figure 7. Published articles studies' methods.

Source: authors

2. *Country Case Study:* the country case study analysis is focused on showing where the articles' studies took place and collected the relevant data. It reflects how international the topic is, and how many countries were included, and which were not. It provides the researcher with hints for future research communities or countries. In our case, studies took place in many countries around the world, Figure 8. shows the distribution of studies in each country.

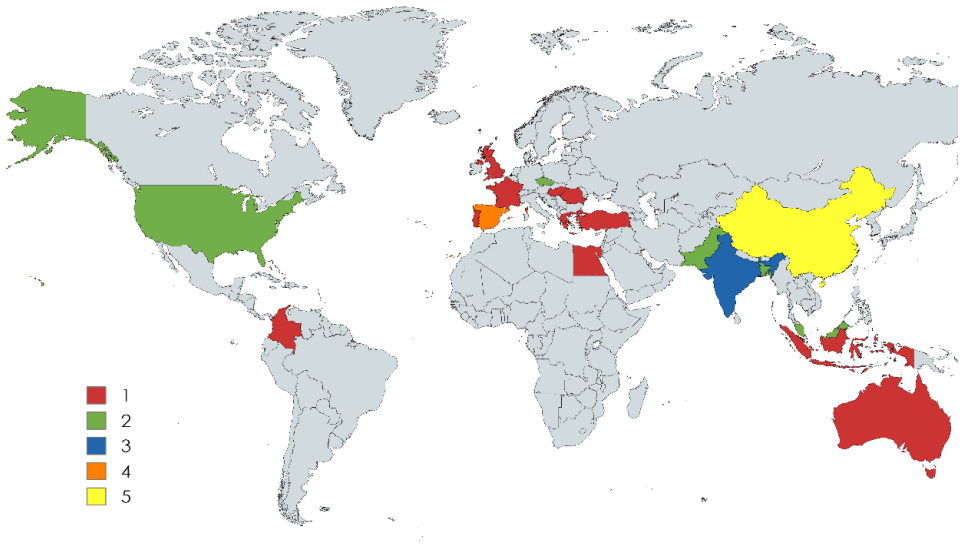


Figure 8. Country Case Study World map

Source: authors- based on R results

It is worth mentioning that 9 studies collected the data on a global scale, one study on the Europe level, and another one subjected to developing country (see Figure 9.). African countries and South America had the lowest representation in the studies. China ranked first with 5 studies, but this could be a reason for being the source of the virus and where it started (Kabil *et al.*, 2022).

Figure 9. Country Case Study frequency.

Source: authors- based on R results

3. *Keyword Analysis*: the keyword analysis is one of the most essential analyses in any literature review especially when it comes to the systematic review (Kabil *et al.*, 2021). this analysis has many types, each one presents a different point of view and delivers different results. e.g., keywords cloud, keywords co-occurrence, keywords frequency, keywords thematic map…. etc. This study will present three types of keywords analysis i.e., keywords cloud, keywords thematic map and keywords co-occurrence.

Keywords Cloud is the most famous keyword analysis (Aria and Cuccurullo, 2017), it is easy to understand and present the details in a colorful visualization, where the size of the word reflects its concurrency. Figure 10. is the keywords cloud for this study, COVID-19 dominate the view followed by sustainability, hospitality, hotels…etc. the highest-frequency keywords must be similar to the search words which have been used in the search query. Moreover, some words may appear in different forms i.e., "COVID-19", "COVID-19 pandemic" and "pandemic", some researchers modify the original database to eliminate this issue, but in this study, the database has been left virgin without any interaction.

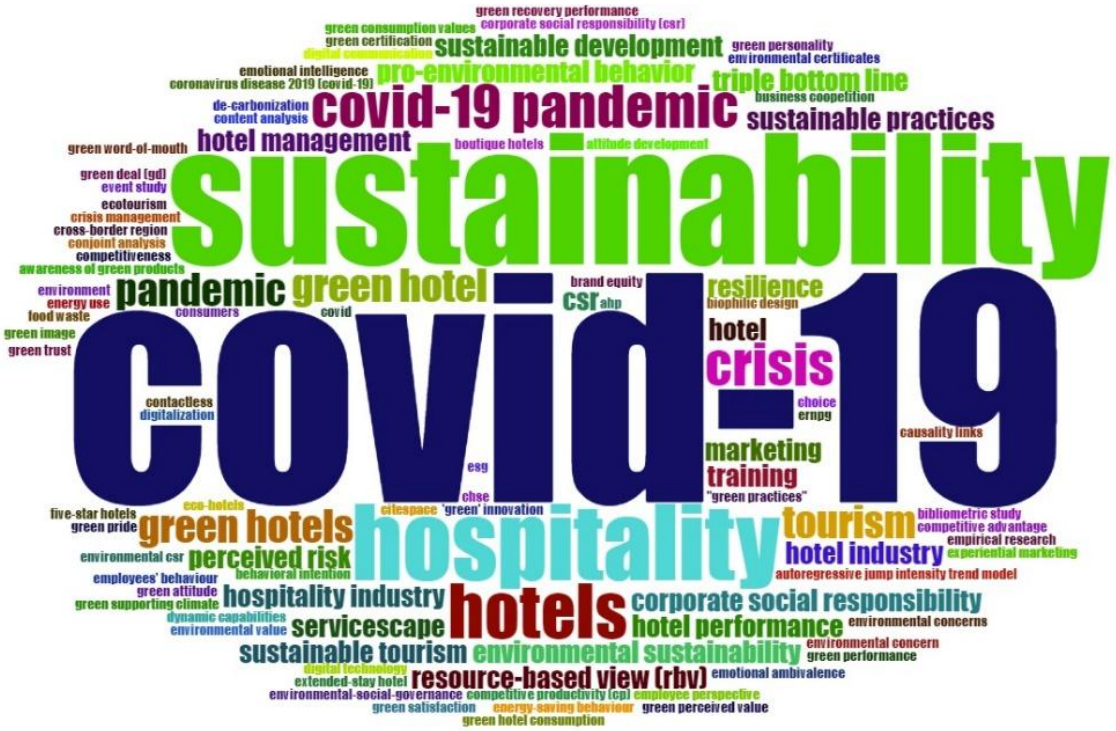


Figure 10. Keywords cloud.
Source: authors- based on R results

The thematic map (see Figure 11.) presents the cooccurrence for the keywords using a visualization based on a network with two dimensions: centrality (relevance degree) and density (development degree) (Aria and Cuccurullo, 2017). This analysis divides the keywords into four quarters, each quarter is a main group. Those four groups/quarters are niche theme (the upper-left quarter), emerging/declining theme (the lower-left quarter), motor theme (the upper-right quarter), and basic theme (the lower-right quarter).

The niche theme represents words with low centrality and high density, it includes the keywords for topics that are isolated but have a high level of development. E.g., marketing, perceived risk…

etc. The emerging/declining theme includes the emerging words or the opposite as the disappearing words. i.e., green hotel. The motor theme includes the high centrality and high-density level. In other words, keywords in this quarter are highly developed and important for the literature's structure about the included topics e.g., hotel performance, hotel management, crisis… etc. While the basic theme includes keywords which have high centrality and low density, in other words, it includes words which represent general topics that are important to the research field, but it is not the development. E.g., COVID-19, hospitality, sustainability… etc.

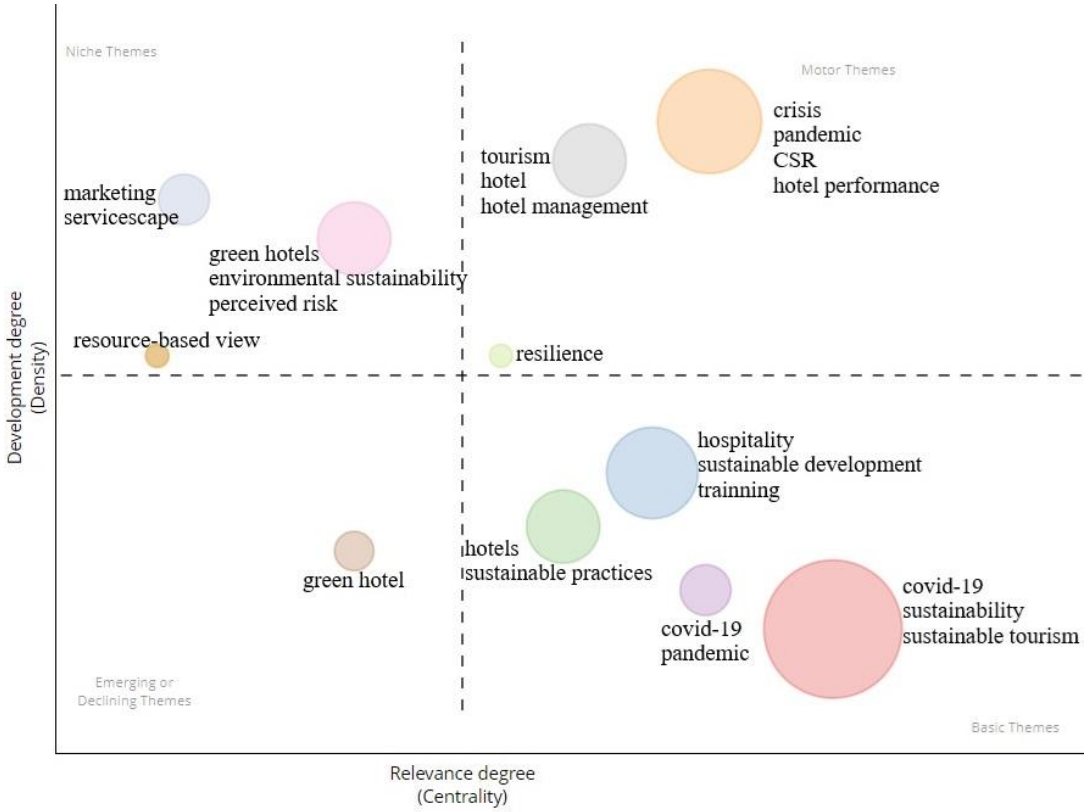


Figure 11. Keyword themes

Source: authors- based on R results

4. *authors and Collaboration analysis*: understanding the scientific community is important and author analysis helps with that (Alreahi, Bujdosó, Dávid, *et al.*, 2023), where this analysis shows the top cited articles and the contribution of authors to the study topic. Using the number of publications and top-cited articles analysis for the top writers regarding this study topic depending on bibliometric data will be the used author analysis type in this study. According to scientific publications regarding the effects of COVID-19 on green practices in the hotel industry, 161 authors participated in the selected articles, only 7 authors have written 2 articles, and the rest of the authors did only one related to this study topic. Four authors recorded 82 citations with a collaborative article, another 3 authors who also collaborated in one article got 54 citations, one author with one article and 49 citations and so on. This may reflect that even some authors have written one article on this topic, but they score a high citation, and also if there is a collaboration. Table 4. presents a better view of the citation and publication numbers regarding this study topic.

Table 4. Top authors by top cited document and by publications' number (NP)

Author/s	TC.D	Author/s	NP	TC
ZENG, K. J. et al. (46)	82	SALEM, I. E. (15.39)	2	35
KHAN, K. et al. (50)	54	ELKHWESKY, Z. (15.39)	2	35
FILIMONAU, V. (48)	49	HASAN, A. AL-TOWFIQ (3.19)	2	2
XU, LI et al. (36)	36	AGINA, M. F. (9.27)	2	2
YANG, J & LIU, C (26)	33	AL-ABYADH, M.H. ALI (9.27)	2	2
CLARK, J. et al. (41)	29	ALSETOOHY, O. (9.27)	2	2
VARMUS, M. et al. (39)	28	ELSHAER, A. (9.27)	2	2

*Source: authors- R results/ * TC.D: top cited document, * NP: Number of publications, * TC: total citations*

It is also important to present the collaboration among scientific institutions and universities around the world. In this study topic, the collaboration was high, researchers representing 121 scientific entities wrote about this study topic. 84 scientific organizations collaborate at different levels, Figure 12. shows the collaboration between more than four scientific entities. The Egyptian knowledge bank had the highest collaboration level with 16 links with other institutions and so on.

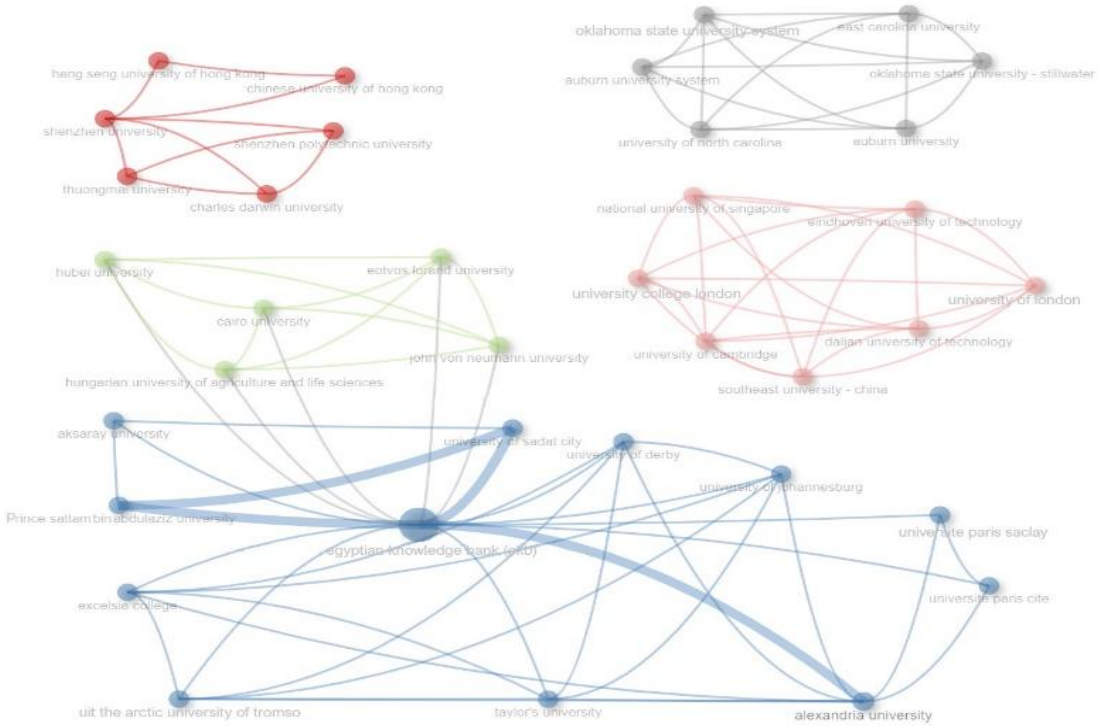


Figure 12. Academic Institutions Collaboration Network

Source: authors- based on R results

Another level of collaboration is the country collaboration level (see Figure 13.). For this topic, authors from 44 countries did write about it. However, authors from 32 countries only collaborate at different levels to write a joint article. Authors from China had the highest number of publications, followed by Egypt, the US, Australia and so on. And the number of linking lines represents the collaboration level.

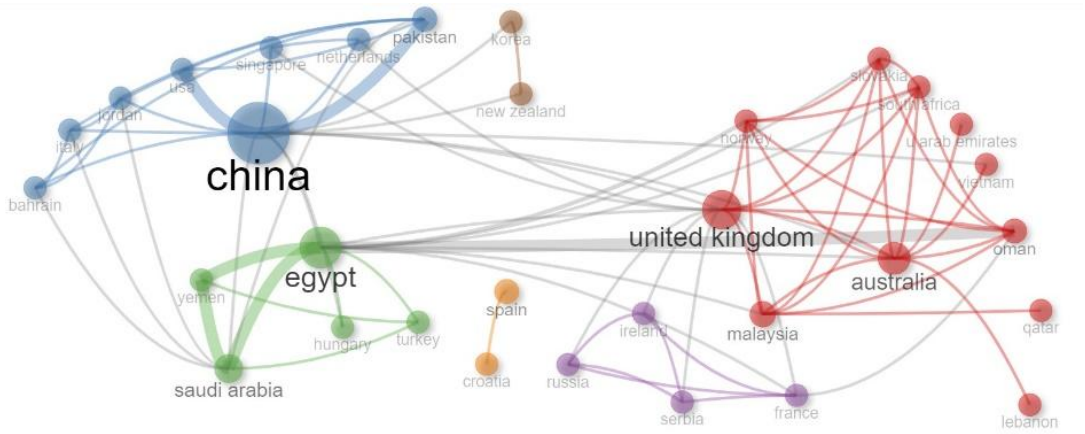


Figure 13. Countries collaboration network

Source: authors- based on R results

The Deep Content Analysis Level

In the deep content analysis, we tried to classify the effects of COVID-19 on green practices in the hotel industry. By fully reviewing each selected scientific record, we searched for both negative and positive effects, because many studies mentioned the recovery due to the restrictions made to reduce COVID-19 inflation, and in the same direction, we tried to reveal that suspension around the hotel industry and summarize how was that effect.

In general, we could address the COVID-19 effects on green practices in the hotel industry into 23 different categories. But to simplify the results more, we categorized those 23 categories into 6 main groups i.e. Resources, Employees, Customers, Marketing, Upgrading, and performance.

The resources group is about the effects on used resources in the hotel's daily work, and it includes 5 categories i.e., water, waste, food, energy, and plastic.

The employees' group is about how the virus affected the employees in the workplace regarding green practices, and it contains two categories i.e., employee's behavior and green training.

The third group is the customers' preferences, it is about the changes in customers' preferences, how their experience during COVID-19 was, and how it will affect their future booking decisions when it comes to choosing between green or traditional hotels, regarding green practices.

The fourth group is marketing which is about the green marketing tools and performance during COVID-19 and after. It contains four categories i.e., green marketing, environmental certificates, green practices announcement and greenwashing.

Then comes the Upgrading group which will be about the unusual upgrading to confront COVID-19 and keep the business running. 7 categories will be included i.e., green investment, cleaning, process upgrading, sections closing, online working, paperwork and adopting a high tech.

Finally, the performance group will be about the hotel's performance and how green practices affect it. three categories will be included i.e., cost, market position, and performance.

Table 5. previews the selected scientific records and the six main groups which have been mentioned above. Shortcuts for categories have been created and used in the table, and their description is below the table, two columns are in each main category, column (P) which refers to Positive effects and column (N) which refers to Negative effects. The categories in each main group will be discussed in the discussion part and a more detailed table includes all categories will be provided in the attached part.

Table 5. The COVID-19 effects on green practices in the hotel industry in the collected literature

	resources		performance		customers		employees		marketing		upgrading	
	P	N	P	N	P	N	P	N	P	N	P	N
(Fatima and El-banna, 2023)	Wr						GT				GI, On	
(Hasan, 2022)					CP							
(Mehta and Sharma, 2021)		Ws	C, MP					GT			Up	
(Saepudin and Putra, 2023)	Ws, E	Ws			CP		GT				Cl, Cs, S	
(Chen and Peng, 2023)		Pl			CP	CP		GT	GM			
(Chen, Su and Chen, 2022)			C, MP									
(Abdallah M. Elshaer *et al.*, 2022)				P			Em				Up, Tk, S	
(Johann, 2022)					CP						On, Pp, Tk	
(Wang *et al.*, 2023)					CP		GT		GM			
(Cardoso *et al.*, 2023)							GT		GM		On, Pp	
(Karatepe, 2022)				P				Em				
(Zhang *et al.*, 2022)					CP	CP			GM	GM	GI	
(Elkhwesky, El Man-zani and Salem, 2022)			C, MP						GM		GI, Tk	
(Vávrová, 2022)	E		P		CP		Em				GI	
(Hasan and Rahman, 2022)					CP							
(Ņikadimovs and Rodčenkova, 2021)			P							GM	GI, S	
(JosephNg, 2023)											Cl, Tk	
(Marques *et al.*, 2022)											Cl	
(Lin *et al.*, 2023)					CP				GM		GI	
(Liu and Yang, 2021)											Tk	
(Alsetoohy *et al.*, 2022)			P				Em					
(Syariati *et al.*, 2023)	E						EM, GT				Up	
(Tothova *et al.*, 2022)			P						GM			
(Serrano-Baena *et al.*, 2023)	Ws				CP				GM, GA		GI	
(Gupta and Sahu, 2021)	Ws				CP		EM, GT		EC			
(Marco-Lajara *et al.*, 2022)	Ws		P						EC		Up	
(Šerić and Šerić, 2021)	Ws, Wr, E				CP							
(Elkhwesky *et al.*, 2022)	Ws, Wr, F, E			C							Tk, Cl	GI
(Alreahi, Bujdosó, Lakner, *et al.*, 2023)			P									
(Bhrammanachote and Sawangdee, 2021)	Wr, E										Up, Cs, On	
(Clark, Mauck and Pruitt, 2021)			MP						GM			

(Babeú-Bolyai University, Cluj-Napoca, Romania *et al.*, 2022)	Ws, F, E				CP		GT		GM		Cl	
(Lin, Shyu and Li, 2023)	Ws, Wr, E, Pl	E					EM, GT				Cs, S	GI
(Batool, Mohammad and Awang, 2022)							Em					
(Varelas, Karvela and Georgopoulos, 2021)			C,P								Tk	
(Jian *et al.*, 2020)			MP		CP						S	
(Assaker and O'connor, 2023)			MP						EC			
(Filimonau, 2021)	Ws	F,Pl									Up, Cs, S	
(Xu *et al.*, 2022)							Em					
(Hameed, Hussain and Khan, 2021)					CP				GM, EC			
(Taşçıoğlu and Yener, 2022)					CP	CP			GM			
(Robina-Ramírez, Medina-Merodio and Estriegana, 2022)											GI, Up	
(Tao *et al.*, 2023)					CP	CP			GM			
(Kim *et al.*, 2024)			MP, P		CP				EC			
(Gil and Agudo, 2022)			C, P				GT					
(Li *et al.*, 2023)				C	CP							GI
(Zaman *et al.*, 2022)											Tk, S	
(Gil-Saura *et al.*, 2023)					CP				GM			
(Zutshi *et al.*, 2022)			C, P		CP						GI	GI, Up
(Adongo, Choe and Sulemana, 2023)			MP						GM			

*Source: Authors/ * Waste (Ws), Water (Wr), Food (F), Power (E), Plastic (Pl), Cost (C), Market position (MP), Performance (P), Customers preferences (CP), green marketing (GM), Green Practices announcement (GA), Green washing (GW), Green investment (GI), cleaning (Cl), Upgrading the process (Up), Closing unnecessary parts (Cs), Online (On), No paper (Pp), Technology (Tk), SCM (S).*

Discussion

As mentioned in the result section (Table 5.), six main topics will be discussed in addition to the interviewed managers' points of view.

1. COVID-19 effects discussion

COVID-19 forced a huge change in all life aspects, and the hotel industry is one of them. Regarding the environment, green practices in the hotel industry had their share of this shock. In the beginning, it was hard to adopt any upgrade to keep the job green, because everything happened fast, but with time, change started to take place

1. Recourses: the practices to face the spreading of the infection increased the amount of waste so much (Mehta and Sharma, 2021; Saepudin and Putra, 2023) and it was not controllable, everything had to be warped in plastic which increased the plastic waste enormously (Filimonau, 2021). Moreover, the leftover food lost its value because of the restriction of reuse (Filimonau, 2021). But within time, green hotels started to adapt to the situation and recover from the shock, green practices came back to the scene. Using rescuable materials, especially plastic was adopted (Babeú-Bolyai University, Cluj-Napoca, Romania *et al.*, 2022; Lin, Shyu and Li, 2023), and more developed waste management became active to deal with food waste and one-time use plastic Items (Serrano-Baena *et al.*, 2023), in addition to medical waste and highly toxic waste which required special care and different processes from the waste management (Elkhwesky *et al.*, 2022; Saepudin and Putra, 2023).

Changing the way of consuming food starting from eliminating any non-necessary amount of food when ordering, changing the ways of presenting food (Filimonau, 2021; Babeú-Bolyai University, Cluj-Napoca, Romania *et al.*, 2022).

COVID-19 reduced the number of tourists which in its turn reduced the water and energy consumption (Bhrammanachote and Sawangdee, 2021), this preserves the power and the gas emissions (Saepudin and Putra, 2023). But this also reduced the financial income and profits, which forced the water and energy management to develop and change in order to fix this financial loss by an effective saving (Šerić and Šerić, 2021; Vávrová, 2022; Syariati *et al.*, 2023). A better water management was also a must due to a special reason which is the high use of toxic material especially in cleaning (Elkhwesky *et al.*, 2022; Hasan, 2022).

2. Upgrading: to face and limit the COVID-19 infection inflation, many upgrades and changes had to be done, some of these changes came on short notice but other changes took time as a result of trying and developing.

Unfortunately, at the beginning when COVID-19 hit, central management of green practices was absent (Zutshi *et al.*, 2022), thou invested funds in green practices were transformed or reduced in favour of COVID-19 requirements or to cover the financial losses (Elkhwesky *et al.*, 2022; Li *et al.*, 2023). But still, some upgrades had positive effects on green practices. The eliminating of paperwork was one of the early steps where digital forms of work and tasks occupied the scene (Cardoso *et al.*, 2023). Many activities and processes shifted to become online, such as online meetings, telework from home when possible, online training, marketing (Bhrammanachote and Sawangdee, 2021; Cardoso *et al.*, 2023; Fatima and Elbanna, 2023), and moreover, online booking, paying and even solving problems for customers (Johann, 2022). In time, some hotels could develop a successful method to depend on technology to run the hotel process, some hotels developed mobile applications to be an online platform as a connection with service providers in hotels (Abdallah M. Elshaer *et al.*, 2022) and for getting access to each client based on his demand and order (JosephNg, 2023), some hotels provide a virtual experience to view the hotel's rooms and facilities before the actual visiting (Elkhwesky, El Manzani and Salem, 2022). Electronic cars have become more demanded by hotels (Elkhwesky *et al.*, 2022). As a result, the increasing adoption of technology has been reflected in the production to become more eco-friendly (Liu and Yang, 2021) and also to reduce the cost due to its efficiency and capability (Varelas, Karvela and Georgopoulos, 2021). And in a while, the production of green and clean energy came alive again (Elkhwesky *et al.*, 2022; Lin, Shyu and Li, 2023).

Some upgrades came in different forms, hotels followed different strategies such as closing some parts and floors of the hotel due to the low level of occupying (Saepudin and Putra, 2023), this action alone saved a lot of wasted energy, water, and cleaning materials (Bhrammanachote and

Sawangdee, 2021; Lin, Shyu and Li, 2023) and the open buffet which reduced the food waste (Filimonau, 2021).

Cleaning and sanitizing methods developed over time, using ultraviolet rays to sanitize have proven their efficiency and become more adopted where this ray is 100% environmentally friendly instead of harmful chemicals (JosephNg, 2023; Saepudin and Putra, 2023). More ecological or natural chemicals and cleaning products became available with the same efficiency level of harmful chemicals (Elkhwesky *et al.*, 2022; Marques *et al.*, 2022; Saepudin and Putra, 2023).

During COVID-19, an upgrade in the normal supply chain management was necessary, because of the borders closing and delay in shipping (GUEVARA, 2020; Kuo, 2021). this forced hotels to become more conscious and purchase what is necessary (Filimonau, 2021; Abdallah M. Elshaer *et al.*, 2022), using the technology for better resource management (Zaman *et al.*, 2022). Dealing more with local producers to save time, which also on the other hand reduced the negative transportation and delivery effects on the environment (Lin, Shyu and Li, 2023; Saepudin and Putra, 2023). For green hotels, collaboration levels were raised with providers to import environmental and recyclable products which reduced the waste too (Jian *et al.*, 2020; Abdallah M. Elshaer *et al.*, 2022). COVID-19 redefied the value chain by utilizing resources, energy, suppliers, logistics and technology (Ņikadimovs and Rodčenkova, 2021).

3. Performance: over time, hotels started to adopt the situation and realise that returning to invest in green practices is a must (Elkhwesky *et al.*, 2022; Gil-Saura *et al.*, 2023), because green practices proved their influence on reducing operational costs and providing a responsible consumption (Mehta and Sharma, 2021; Gil and Agudo, 2022), this led many hotels to increase the adoption of green practices and management after COVID-19 risk minimized (Elkhwesky, El Manzani and Salem, 2022; Zutshi *et al.*, 2022). studies revealed that during COVID-19, green hotels had in general a better performance (Tothova *et al.*, 2022; Alreahi, Bujdosó, Lakner, *et al.*, 2023), green hotels had the ability to respond to a COVID-19 shock faster than regular hotels (Chen, Su and Chen, 2022) because it has a better organizational response especially when a green certification is obtained (Marco-Lajara *et al.*, 2022). Additionally, hotels with a higher ESG rating are less susceptible to the negative effects of COVID-19 especially when it comes to financial performance and market value (Chen, Su and Chen, 2022; Assaker and O'connor, 2023). In short, Environmental practices became an additional competitive advantage after proving their efficiency in many aspects within the hotel industry during and after COVID-19 (Mehta and Sharma, 2021; Elkhwesky, El Manzani and Salem, 2022; Adongo, Choe and Sulemana, 2023; Kim *et al.*, 2024).

4. *Marketing*: with all changing that COVID-19 created, marketing had its share with this update, online marketing became a necessary action (Cardoso *et al.*, 2023). Green marketing importance increased as an effective method to stimulate, educate and introduce the ideas of saving energy to the customers (Elkhwesky, El Manzani and Salem, 2022; Chen and Peng, 2023; Wang *et al.*, 2023), in addition to influencing customers' green behaviour (Gil-Saura *et al.*, 2023). hotels increased the adoption of environmental certifications programs, and adopting green practices, environmental CSR programs (Gupta and Sahu, 2021; Lin *et al.*, 2023; Serrano-Baena *et al.*, 2023), this needed more focus on green marketing as an effective way to enhance the green image (Hameed, Hussain and Khan, 2021) and introduce this change considering it a competitive advantage (Clark, Mauck and Pruitt, 2021; Tothova *et al.*, 2022; Zhang *et al.*, 2022; Adongo, Choe and Sulemana, 2023), moreover, to notify customers that green practices will give the same value and safety towards COVID-19 (Taşçıoğlu and Yener, 2022; Chen and Peng, 2023).

On the other hand, greenwashing increased during this green transformation wave (Zhang *et al.*, 2022). Additionally, marketing campaigns designed to promote hospitality enterprises and to attract revenues might be favoured over environmental and social sustainability issues (Ņikadimovs and Rodčenkova, 2021). Moreover, providing customers with additional information about green practices especially green customers because the doubt and questioning of the reality of green practices increased during COVID-19 because of the increasing of one-time items used, and the great amount of plastic packaging (Chen and Peng, 2023).

5. *Customers' preferences:* COVID-19 had a positive effect on customers' green behaviour and their personal preferences toward the environment and green practices (Hasan, 2022; Kim *et al.*, 2024). green hotels became more favourable (Vávrová, 2022), and customers had no problem to pay more for staying (Jian *et al.*, 2020; Assaker and O'connor, 2023; Kim *et al.*, 2024). Customers green awareness's increased during COVID-19 (Taşçıoğlu and Yener, 2022; Zhang *et al.*, 2022). Moreover, they wanted to participate in environmental protection by staying in a green hotel and collaborating more during their stay to reduce the waste of resources (Wang *et al.*, 2023). They have become less ambivalent about making a reservation at green hotels if such hotels have convincing messages regarding their COVID-19 safety measures (Chen and Peng, 2023) and became a sign of providing healthier and safer accommodation regarding COVID-19 (Hameed, Hussain and Khan, 2021; Tao *et al.*, 2023). Customers demand for green products and trying new green services were increased (Zutshi *et al.*, 2022; Tao *et al.*, 2023). Green services became an important element in customer satisfaction (Hameed, Hussain and Khan, 2021), it attracted more customers and new segments (Tao *et al.*, 2023) and affected positively customers' revisit intentions (Hasan and Rahman, 2022).

On the other hand, customers' green awareness and understanding increased and with it the confusing towards some green services (Zhang *et al.*, 2022), which has forced green hotels to provide the right justification for some protection activities which cause hazards towards the environment (Chen and Peng, 2023). Some customers did not prefer green practices over the high level of protection using non-environmentally friendly products (Taşçıoğlu and Yener, 2022), they did not even accept any risk to try new green services (Tao *et al.*, 2023).

6. *Employees and green training:* the working atmosphere during COVID-19 was not the best, green hotels had to take some actions to make this situation better (Vávrová, 2022). The green training for managers and employees was increased (Lin, Shyu and Li, 2023), because with proper training, employees' engagement becomes easier (Syariati *et al.*, 2023). Managers could affect the employees' behavior as role models to follow and by showing their support (Xu *et al.*, 2022), this encouraged the employees and increased their interest in acting greener (Batool, Mohammad and Awang, 2022). Green training has been increased to deal with the huge and different amounts of waste and energy-saving (Gupta and Sahu, 2021; Saepudin and Putra, 2023), it also provided an online form to reach all employees (Cardoso *et al.*, 2023). Moreover, customers had their share of green training as active participants in green practices during their visits (Gupta and Sahu, 2021; Saepudin and Putra, 2023; Wang *et al.*, 2023). This led to an increase in employees' awareness of environmental consequences and improved environmental performance (Abdallah M. Elshaer *et al.*, 2022; Gil and Agudo, 2022).

But. on the other hand, COVID-19 had its bad effect on employees, regarding green practices, the unsecured job and instance working atmosphere reduced employees' green motive, and a negative emotional behavior outcome (Karatepe, 2022), the advanced green training cost increased because of the high level of turnover (Mehta and Sharma, 2021), where the green training for the customers was in a critical situation trying to explain how the hotel is green and it uses plastic and hazardous chemicals (Chen and Peng, 2023).

2. Managers' interviews and points of views

The coronavirus has imposed a high level of health precaution. Cleaning materials were used Excessively and up to double the regularly used amount in normal life situations. In fact, for a while, some of these materials had a negative impact on the environment, but this was compulsory due to the lack of a suitable alternative.

However, as scientists began to study the virus and analyze the possible ways of infection and sanitizing, shifting to anther types of sanitizing were applied, such as ultraviolet (UV) sanitizing, which was expensive somehow and required a lot of training to be used effectively in a way that ensures that the virus is killed as required and does not cause harm to those who use it, but at the same time this method is completely environmentally friendly. The high-temperature fumigation of tools and some facilities, or fumigation using special sanitary sterilizers, which were also environmentally friendly were widely adopted.

Using Face masks and rubber or plastic gloves was mandatory and crazy at the same time. Everyone, whether employees or clients was forced to wear face masks all the time. As for employees, it was also mandatory to wear rubber gloves and, in some cases, a large plastic face mask divider. All of this stuff had a negative impact on the environment because it was made basically of plastic and used excessively and for one time only.

The presence of hand sanitizers was out of the question in every corner and on every desk, table and room. All of this increased the amount of plastic for packaging and container manufacturing, it was not possible in many cases to use refillable or reusable containers.

As for plastic packaging, almost everything had to be wrapped, not just food or plastic eating equipment. Even clothes, hygiene equipment, and sometimes some office supplies that could not be dispensed with. Yes, the place was breathing plastic.

In my own opinion, COVID-19 has revealed the greedy nature of humanity. The environment was a priority, but when COVID-19 became the priority, everyone forgot about the environment, and profit became the priority, specifically represented by companies that manufacture masks, rubber gloves, packaging materials, plastic containers, and cleaning equipment that are not environmentally friendly. Production went insanely without any concern for the environment, or studying the use of environmentally friendly alternative materials with the same effect and cost, or even at a slightly higher cost. The trend was towards fast and cheap production only to achieve quick and crazy profits.

There were some positive aspects that affected the nature of doing business in general, which had a positive impact on the environment. For example, Paperwork was completely eliminated during the Coronavirus period unless in emergency cases, but after the danger of the virus passed and returned to normal life situation, electronic forms were maintained instead of using paper in most office work.

Additionally, COVID-19 imposed a state of reducing the use of paper money, and it was prohibited in many cases. This took some time, as it was not easy for all customers to apply this, especially from countries outside the European Union, but after a short period, the complete shift was made to electronic payment. COVID-19 forced a qualitative shift and update in banking and electronic transactions and remained prevalent even after the danger had passed. This also mitigates the negative effects of the process of producing and printing currencies on the environment.

The virus also imposed a state of movement ban and partial closedown for a long time, forcing the transition from regular office work to remote work. In fact, remote work has become the only solution for the continuity of many companies, even after the Coronavirus period. For the hotel,

many functions were converted to electronic form when their nature allowed it. Virtual meetings became by default the norm and remained that way even after the end of the virus. That has a positive impact on reducing office expenses and space, in addition to saving the time needed for transportation, in addition to two important environmental impacts, which are eliminating the consumption of fuel necessary for transportation, and the consumption of energy resources needed to run typical offices or actual workplaces were reduced and saved.

When the border closed and partial closedown occurred, the hotel suffered from difficulty in importing many types of products that are used on a daily basis, specifically food products, due to the length of supply chains and the obstacles imposed by the virus, including health inspections, delays at the borders, and others. This led us to deal with local farmers relatively close to the hotel, and as part of our mission as an environmental hotel, the agreement noted that the production has to be environmentally friendly. In this case, the hotel had the upper hand in the agreement because its consumption was relatively high and explained to the farmer that the return would be sufficient if they agreed to adopt environmentally friendly production in case it was not already environmentally. This would not only support the environmental transformation, starting from the source but also mitigate the negative effects of transportation, as the distance has become shorter, in addition to agreeing on environmentally friendly packaging, which reduced plastic consumption to the lowest possible amount.

Initially, we tried to develop a mechanism to reduce the use of plastic cutlery or plastic meal packaging for guests since our hotel was one of the hotels selected as a quarantine center. The mechanism of meal production was studied and monitored from the first step until the meal arrived in the guest room, in addition to how the used dishes were cleaned after the meal was finished. The percentage of the virus on the equipment used at each stage was examined, weaknesses in the process were highlighted, and this process was updated to remove weak spots and gaps in it, until finally, it was possible to serve food without the use of plastic or packaging.

Our hotel has good green spaces. These spaces were used to grow some aromatic bouquets and special medicinal flowers that were used directly or after drying to make tea and hot drinks. This not only saved the costs of purchasing them but also contributed to eliminating the negative environmental impacts resulting from the process of supplying, transporting and packaging.

While the visitors' number declined to less than half, certain floors of the hotel building were closed permanently. This had a positive effect on saving expenses, and at the same time, it led to saving resources that were supposedly used on these floors even if they were not occupied. Whether normal or hot water, in addition to electricity, air conditioning systems, and materials necessary for sanitizing and cleaning. All of this had a positive impact on reducing the negative impact on the environment and saving resources.

The training was mandatory and essential for the workflow inside the hotel with the dangerous presence of the Coronavirus. The fact we are part of an international hotel chain, we follow a policy of standardizing procedures and training, but due to the difficulty of trainers' movement or the slowness of the traditional training process and its inability to keep up with emergency modernization cases in the face of the repercussions of the virus, A special online training platform was created for employees and even customers, it did not only include remote training but also provided access to the content in a recorded form that everyone who has access to it can review at any time and repeatedly. This did not include training regarding the Coronavirus, but it was also used in environmental training for employees and also to deliver our environmental message to guests as well as an effective and innovative way to promote the environmental practices that the hotel is implementing or seeking to implement. It had a positive impact in reducing transportation costs for training or occupying training facilities, in addition to reducing the use of natural resources on

publications and Brochures that seek to raise awareness, whether to publish procedures or instructions for staying in the light of the Coronavirus or for environmental practices. We kept this system even after the virus threat passed.

It is true that my position is deputy general manager, but the virus forced me to directly supervise and develop procedures for a big part of the operations, especially at the beginning of the period when COVID-19 hit, and as part of my specialty, which is catering, I supervised the development of menus directly to ensure that foods are served based on fresh ingredients with high nutritional value using what is available due to the interruption or delay of some materials, with a focus on not overloading the contents of the meal to ensure its consumption almost completely or completely with no leftovers. I also tried as much as possible to reduce the amount of food inventory as consumption is done periodically. foodstuffs were provided by local farms to save transportation and packaging costs and their environmental impacts. We must not forget that the coronavirus forced the elimination of the so-called open buffet and the shift to a meal system, which reduced food waste. But the other fact is that the virus has also made it difficult to deal with leftover food, as it was previously easy to contact outside vendors to take the leftovers and use them for other purposes, such as feeding animals or making fertilizer. However, during the coronavirus, they are now treated as organic waste and their value is not fully utilized due to the high opportunity of being contaminated with the coronavirus, and handling them as before may cause new infections.

The virus indeed reduced development budgets, especially in terms of environmental or unnecessary technological developments, but after the pandemic began to diminish, the hotel began as one of the priorities to modernize the entry systems to the rooms and different areas of the hotel, where the hotel will finish updating the special electrical systems and connecting them to work through sensors instead of magnetic cards. This new system will control the electrical devices working automatically depending on the detected movement's pattern. This would save a lot of energy and therefore not only costs but also the negative environmental impact. As a technical engineer, the costs of this modernization at the current technological level are almost equal to the costs needed to set up access systems using magnetic cards.

In addition, some rooms were used to accommodate part of the staff. This action reduced the rate of infection, saved time and the negative impact of their transportation on the environment, and helped the hotel to be in a better state of readiness.

Conclusions

We highlighted and defied in this systematic review paper the direct and indirect effects of COVID-19's ramifications and precautions on green practices in the hotel industry. Regarding green practices, COVID-19 effects were not limited to a certain section or time or segment, it has influenced significantly every detail and aspect, starting from managers, employees, customers' preferences, and even vendors and suppliers. It has forced an upgrade to be taken in each department, modifying processes and tasks, up-levelling used technology, affecting the working atmosphere, changing the resources consuming patterns, and even changes outside hotels. In the same direction, the effect of green practices was positive and also negative sometimes, it has improved the working within hotels in many aspects but at the same time, these changes did not come with the desirable results without huge efforts and costs, and sometimes when it was done inappropriately, a negative

outcome occurred whether financially, organizationally, reputation and as an attractive place. Moreover, COVID-19 has revealed a huge set of hidden possibilities to upgrade hotels' activities in order to achieve better environmental performance and performance in total.

Limitations and future research.

This study took into consideration available scientific records from 2020 till the end of 2023, future research may expand to include additional scientific records from 2024 because the scientific community is still interested in COVID-19's effects on many aspects including the hotel industry. Moreover, an additional scientific database may be taken into consideration, while this study focused on available scientific records in the WoS (Web of Science) database. Additionally, this review article focused on the effect of COVID-19 on the hotel industry from the environmental practices aspect. The study divided those effects into six main groups, further studies can study the same issue but with different grouping for those effects. For the analysis levels and sub-levels, additional and different analyses or methods could be applied to generate more results in different forms. Regarding this study's results, some segments were not subjected in sufficient amounts such as the owner segment. Some important factors were absent in scientific records which are the governmental actions and support for green practices during COVID-19 which could be considered as an important topic for future research to be studied and analyzed. The study conducted several interviews with different managers in different hotel scales, more interviews could be conducted in order to extract more results and present more points of view from managers' experiences during COVID-19. Furthermore, the international energy crises duo to the Russian war on Ukraine occurred during the COVID-19 era, which gives more possibilities to form new studies merging both energy crises and COVID-19 crises in one analysis.

Implications

In this study, the effect of COVID-19 on green practices in the hotel industry was presented, with an aim to help decision-makers understand the main picture and be able to take better actions based on previous studies and experiences. This study showed that change during crises and hard times may be the best solution to achieve better performance, crises always influence business harmfully, but they also push businesses to upgrade, modify and adopt new practices to adapt to the situation and minimize loss and even generate competitive advantages in the center of the storm. Regarding the hotel industry, the adoption and the upgrade of green practices was one of the most effective methods to reduce the negative effects of COVID-19 on the industry.

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