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# Mapping the impact of COVID-19 crisis on the progress of sustainable Development Goals (SDGs) - a focus on global environment and energy efficiencies

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## ABSTRACT

The novel coronavirus disease has spread uncontrollably all over the world within a short span of time and has affected the development of the world in many ways. All the nations have directed their technical, financial and political resources towards controlling COVID-19 pandemic across the world. It is predicted that the impact of this crisis will remain for longer period of time, affecting the livelihood of people and all those activities that were contributing to the development of the nations across the globe. In fact, the most promising and significant seventeen Sustainable Development Goals (SDGs) that were adopted in the year 2015 by the United Nations (UN) Member States addressing various global issues, now seem difficult to be achieved by 2030 due to coronavirus pandemic. However, even though the COVID-19 pandemic might have turmoil effect on the existing growth of the world, still few positive developments may be observed in the long run due to this pandemic. Therefore, this study focuses on identifying and quantifying the impact of COVID-19 pandemic in achieving the UN SDGs. This study brings out both negative as well as positive influences of the pandemic on the environment and energy related SDGs. The study uses Analytic Hierarchy Process (AHP) to calculate the weights of the identified positive and negative influences for each environment and energy related goals. Further, 4–1 ratings are used to identify the severity of the influences on the SDGs. Finally, a score is calculated using weights and ratings that indicates the overall impact of the pandemic on environment and energy related SDGs. The result obtained in the study shows that the pandemic offers an opportunity to develop action plans that can build more environmentally sustainable future.

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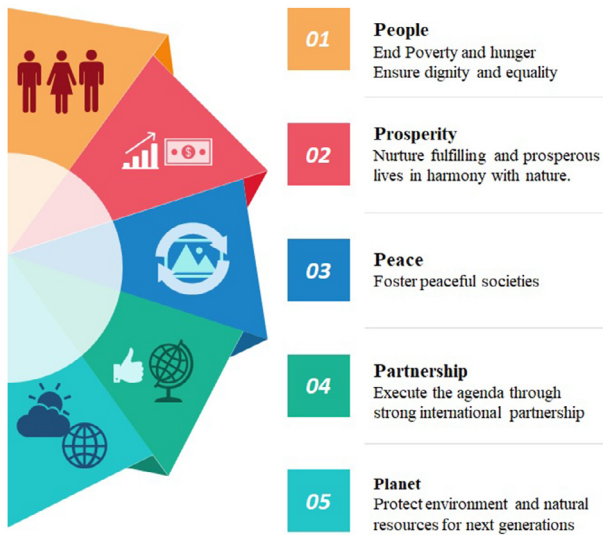
## 1. Introduction

As the COVID-19 has been rapidly spreading to six continents of the world, the countries worldwide have declared health emergencies [1]. The current pandemic has severely affected many lives and has led to major economic disruptions. The effect of pandemic was also observed on the businesses all over the world, wherein organizations not engaged in providing essential products or services, were forced to either shut-down or change their entire business processes [2]. Inflation, poverty, unemployment, and high levels of national debt are considered to be some of the major threats of the pandemic.

In the year 2015, 193 Member States of United Nations (UN) adopted a fifteen-year sustainable plan “the 2030 Agenda” built on the principle of “leaving no one behind” for achieving Sustainable Development which is comprised of 17 Sustainable Development Goals (SDGs) with total 169 targets [3]. These SDGs are the universal call to action to protect the environment of the planet, stop poverty and improve everyone’s life and prospects [3]. These 17 SDGs are categorized into 5 major pillars as shown in Fig. 1 i.e. People (Goals 1 to 6), Prosperity (Goals 7 to 11), Planet (Goals 12 to 15), Peace (Goal 16), and Partnerships (Goal 17) [4].

The government of UN Member States has assigned budget to various industries in order to achieve their respective sustainable development goals. The primary objective of SDGs framework is to progress together, which means nobody should be left behind [5]. The formation of the SDGs referred as a co-creative process

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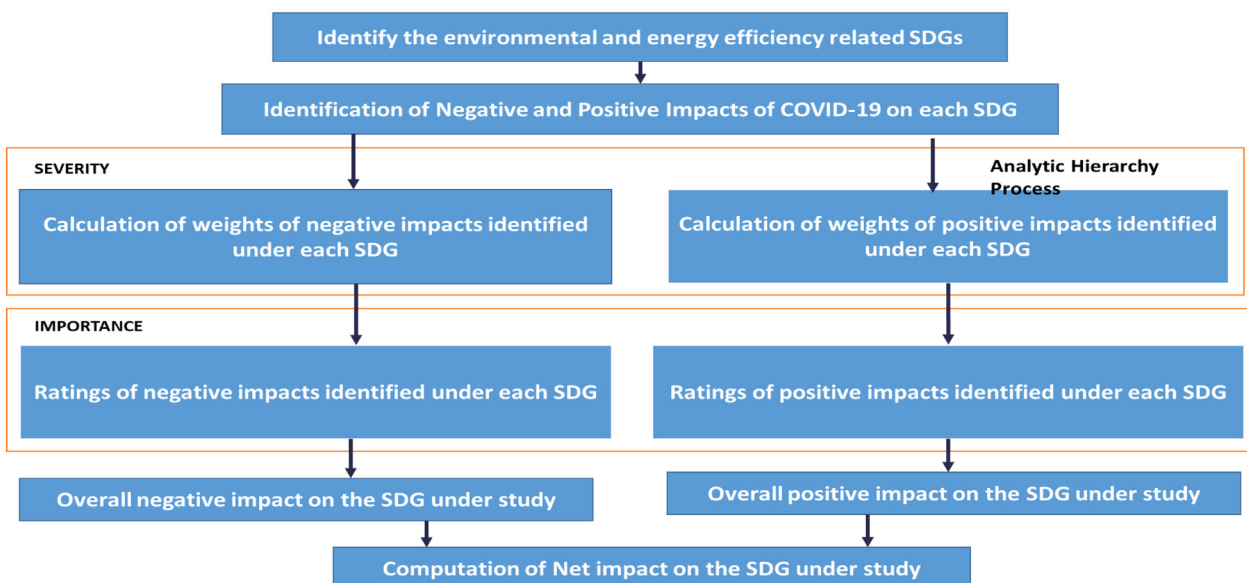
**Fig. 1.** Five Pillars of SDGs. Source: Gulseven O, Al Harmoodi F, Al Falasi M, ALshomali I. How the COVID-19 pandemic will affect the UN sustainable development goals?. (2020). Available at SSRN 3,592,933.

in which many voices were allowed to participate and gave a sense of ownership [6]. These SDGs are applicable universally across the globe which encourage equality between developing and developed countries [7]. Ultimately, these SDGs are more committed towards some global problems like poverty, world peace, climate change, clean air and water). The shared knowledge, technology, financial resources and innovation are the essential components contributing to achieve these global SDGs [5].

The year 2020–2030 was declared as the ‘Decade of Action’ by the UN in order to achieve these goals, collectively as One World & One Human-Kind. However, unfortunately, right in the beginning of the new decade, the year 2020 hit with the unpredictable health disaster COVID-19 throughout the world which resulted in the restricted international migration, closed borders and isolated economics [8]. This pandemic is not only responsible of public health emergency but it also has short-term as well as long-term social, economic and environmental effects and hence, somewhere

affecting SDGs worldwide. The early estimation in the year 2020 showed that the global economy may reduce to 1% (UN 2020a), on the other hand, next projections indicated a possible reduction in global GDP by 5.2% which is the largest economic shrink since the Great Depression [9]. Moreover, climate change and environmental pollution may be occurring at slower pace as compare to pandemic, but still if not controlled in a specific period of time may become highly risky for human survival [10]. It is expected that COVID-19 might have intense and long-lasting impact on global economy as compared to global financial crisis which occurred during 2008–2009 [11]. These impacts can be a serious threat to the industrial development of nations and eventually, to the realization of the UN Sustainable Development Goals by the year 2030 [12]. It is observed that this pandemic has stimulated the unforeseen crisis globally in various areas such as hunger, unemployment, poor health system, poor environment, poverty, and lack of global cooperation, education, hygienic water and sanitation [13,14]. Ultimately, this crisis is instigating an immense loss to human- life all over the world and may have a long-term impact on sustainable development as well as global economy [8].

The worldwide recession occurred due to COVID-19 impact is terrifying and forcing to find out whether SDGs are appropriate for the post-pandemic era or not [15] and to what extent. Hence, it is important to understand in what ways this pandemic is impacting UN SDGs. Many significant achievements have already been recorded in the realization of SDGs targets since the year 2015. With all possible hurdles, still many nations were managed to seriously implement these goals smoothly and strategically under their national development programs. However, with the advent of the COVID-19 pandemic, the statistics of the efforts taken by these nations have been altered. The primary objective of this study, therefore, is to study the impact of COVID-19 on the current progress of SDGs. The study specifically focuses on global environment and energy efficiency related SDGs i.e., SDG-7, 9 and 13, which are directly or indirectly related to renewable energy or environment. This study brings out both negative as well as positive influences of the pandemic on the environment and energy related SDGs. The study uses Analytic Hierarchy Process (AHP) to calculate the weights of the identified positive and negative influences for each environment and energy related goals. Further, 4–1 ratings are used to identify the severity of the influences on the



**Fig. 2.** Framework of the Study. Source: Original.

SDGs. Finally, a score is calculated using weights and ratings that indicates the overall impact of the pandemic on environment and energy related SDGs. The result obtained in the study shows that the pandemic offers an opportunity to develop action plans that can build more environmentally sustainable future.

There are few recent studies in the literature which have discussed both positive as well as negative the impact of COVID 19 on the SDGs. [16] have emphasized that the COVID-19 should be considered as a catalyst for the progress of SDGs. The unique challenges imposed by the pandemic should be leveraged in the implementation of the SDGs. [13] argued that with the emergence of pandemic, there is need to integrate SDGs both at the national level as well as individual level. [17] have highlighted the relevance of information systems in tackling SDG to combat the impact of COVID-19 pandemic. [5] have explored the challenges that has come up due to spread of pandemic across the globe. [12] discusses the ways the pandemic is influencing SDGs. They also suggested that the pandemic may jeopardize the implementation process of the SDGs. [18] also emphasized that any advances made on SDGs are eroding due to the pandemic especially increase in extreme poverty. [19] have identified negative and positive impacts of pandemic on 17 SDGs. The authors have also provided relevant suggestions for achieving SDGs in the era of post-pandemic. [20] has analyzed socio-economic impacts of the pandemic and also suggested some ways to deal with such pandemic in future so as to avoid any divergence in the implementation process of SDGs. A review of the literature shows that a few studies have identified the impact of COVID-19 on SDGs. However, there is no study which quantifies the overall impact of the pandemic on the progress of SDGs. Therefore, from the quantification point of view this study is novel. The framework of the study indicating step-by-step process is shown in Fig. 2.

The rest of the paper is organized as follows: Section-2 of the study discusses the primary objectives of SDG 7, 9, and 13 considered in this study. Section-3 discusses the research methodology used in the study. Section-4 discusses the results and analysis of the study followed by conclusion of the study.

## 2. Objectives of SDG-7, SDG-9, and SDG-13

In this section, the focus and important objectives of SDG-7, 9 and 13 have been explained.

### 2.1. SDG – 7: Affordable and clean energy

The seventh sustainable development goal focuses on providing access to sustainable, reliable, modern and affordable energy to everyone across the world [5]. Over the last decade, even though, the world has made noticeable progress towards providing access to electricity, enhancing energy efficiencies and expanding the use of renewable energy in the electricity sector, still the world is running short in achieving sustainable, reliable and affordable energy for everyone [3].

Following are the changes that have been recorded under the SDG-7 over the period of time [21].

- The rate of accessing electricity globally increased by around 7% from 2010 to 2019.
- The global electricity access deficit dropped to 759 million in the year 2019.
- The capacity of hydropower per capita stayed constant in 2019.
- The per capita solar as well as wind capacity expanded very faster by around 22% & 11.3% respectively.

Although, a lot of efforts towards in improving energy efficiency have shown some improvements, still lot of people across the world lack the access to the basic services of electricity and also a stagnant progress in providing clean cooking fuels and technologies have been observed which further affecting the health of women as well as children [22].

Additionally, the COVID-19 pandemic has disclosed inequalities in accessing the reliable energy especially in rural as well as peri-urban areas of the world. This pandemic has also highlighted the urgent need of expanding the reliable and affordable energy access to mitigate the impact of the crisis [23].

### 2.2. SDG – 9: Industry, innovation and infrastructure

The ninth goal focuses on establishing resilient and functioning infrastructure for successful development of the societies. Our industries and infrastructure need to be sustainable and upgraded in order to deal with the future challenges, unleash competitive and dynamic economic forces [24].

The manufacturing and transport sectors have been affected severely due to COVID-19 pandemic causing reduction in jobs and incomes for employees and workers in these industries [21]. The world is still lagging behind to get the full benefits of this goal, especially, the least developed countries are required to advance their manufacturing industries and gear up the investment in research as well as innovations [3].

In fact, small-scale industries of emerging and developing economies are the major sources of employment and alleviation of poverty as well as may play a major role in recovering from the crisis due to COVID-19 [25].

Following are the changes that have been recorded under the SDG-9 before and during COVID-19 [21]:

- As per data for the period 2018–19, around 300 million rural dwellers out of 520 million still lack safe access to roads.
- A significant decline in manufacturing production observed of around 8.4% in the year 2020.
- The global Manufacturing Value Added (MVA) share in GDP decreased from 16.5% in the year 2019 to 15.9% in 2020.
- The employment in manufacturing sector severely hit due to pandemic and hence, reduced by 5.6% & 2.5% in the second and third quarter of the year 2020 respectively.
- A global decline in CO<sub>2</sub> emissions due to manufacturing have been recorded from 2014 to 2018 due to advancement in power sources of developed economies. However, the world has recorded a historical decline in CO<sub>2</sub> emissions because of mobility restrictions and national lockdowns in the year 2020 but which may reach to usuals levels, once the nations resume their pandemic restrictions.

Although, the outbreak of COVID-19 has affected the progress of SDG-9 still it also gives opportunities to build sustainable industries and innovative technologies specially to developing countries.

### 2.3. SDG – 13: Climate action

The focus of the thirteenth goal is to take urgent and necessary actions for combating climate change as well as its impacts. The weather patterns are altering extremely; levels of sea are rising because of climate change which is disrupting every corner of the world including national economies and lives [3]. The second warmest year was recorded in the year 2019 which brought massive hurricanes, wildfires, floods, droughts and other climate-based disasters across the world [25]. The levels of CO<sub>2</sub> emissions and other greenhouse gases in the environment reached to new records in the same year [3]. However, from the year 2015 to 2020 are con-

sidered to be the warmest period which hinder the achievement of many other SDGs. Moreover, the greenhouse gases and other harmful emissions continued to rise in the year 2020 also despite of national lockdowns, safety measure and other restrictions taken in response to the outbreak of COVID-19 [21]. In fact, it is expected the emissions will reach to much higher levels once the global economy starts to recover from the coronavirus outbreak.

Hence, protecting lives and their livelihoods needs urgent attention and actions to tackle the pandemic as well as climate change emergencies.

### 3. Research methodology

The Analytic Hierarchy Process (AHP) had been used in this study for mapping the impact of COVID-19 crisis on the progress

of SDGs-7, 9, and 13. AHP is an effective tool for dealing with complex decision making and may aid the decision maker to set priorities and make the best decision.

As the first step of the methodology, both negative impacts as well as positive impacts of pandemic on SDGs 7, 9, and 13 were identified. Table 1 Table 2 and Table 3 summarize the positive and negative impacts of pandemic on SDG-7, 9, and 13.

The next step was to collect the data in order to assess the severity and importance of each impacts identified under SDG. To assess the severity of COVID-19 impacts on SDGs, AHP was used. To assess the severity, impact of pandemic was examined on three dimensions of sustainability i.e., environment, social and economic. Therefore, these three dimensions became the criteria for the AHP process. The data was drawn out in the form of expert opinions from the stakeholders which include professionals with in-depth knowledge, skills and practical understanding of environ-

**Table 1**  
Impact of COVID-19 on SDG-7.

Negative Factors	Explanation
Higher need of energy	Urgent need for sustainable, reliable and affordable energy for: hospital and health facilities to treat patients specially during pandemic communities to pump clean water accessing vital information out-of-school/college students
Disturbances in supply chains	Disturbances in supply chains due to lockdown in many countries, which created chaos on providing energy services
Reduced electricity demand	Global Demand of electricity decreased by 2% in 2020 indicative closure of most of companies and non-production across several industries.
Non-affordability to basic energy services	People losing jobs due to the pandemic resulted in reducing their ability to afford basic energy services
Positive Factors	Explanation
Increased use of renewable energy	Use of renewable energy for power generation increased by nearly 7% as renewable energy has been observed more resilient. Focusing on recovery plans boost the deployment of renewable energy-based technologies.
Lower base lending rates	Due to decline in interest rates and friendly monetary policies by Central banks of advanced economies may lower base lending rates for certain period.

Source:

- UN (United Nations) website: [www.un.org](http://www.un.org)
- Division for Sustainable Development Goals (DSDG). The United Nations Department of Economic and Social Affairs (UNDESA). Retrieved from: <https://sdgs.un.org/>
- The Global Goals for Sustainable Development. Retrieved from: <https://www.globalgoals.org/>
- Sustainable Development Goal Indicators Website: <https://unstats.un.org/sdgs/report/2020>

**Table 2**  
Impact of COVID-19 on SDG-9.

Negative Factors	Explanation
Industrial slowdown	A sharp decline in Manufacturing and transport industries were observed. Different industries were hit unequally. Rollout of mobile-broadband networks slowed down in 2020 Decline in Aviation Industries Small-scale industries are vulnerable to unexpected shocks because of their restricted sources and size
Income losses	The pandemic caused huge job losses and income of workers
Lower MSMEs performance	Small-scale industries are vulnerable to unexpected shocks because of their restricted sources and size
Economic slowdown	Direct and severe impact on global economy due to COVID-19 crisis
Vulnerable supply chains	Disruption caused in global supply chain
Positive Factors	Explanation
Reduction in emissions	Historical decline in CO2 emissions due to lockdown and travel limitations
Resilient industries	High & medium technology-based industries like IT, Electronics, Automobiles, Pharmaceuticals have recovered quickly from the pandemic disaster
Role of SMEs on economic development	Small-scale industries contributing to income generation and alleviating poverty. They are also helping in recovering the global economy
Increased investment in R&D	Increased investment in R&D at a higher speed to cope up with crisis like pandemic
Higher use of technologies	Increased need of digital technologies and Internet connectivity
Improved infrastructure	Developing industries and infrastructure with more hygiene and safety measures

Source:

- UN (United Nations) website: [www.un.org](http://www.un.org)
- Division for Sustainable Development Goals (DSDG). The United Nations Department of Economic and Social Affairs (UNDESA). Retrieved from: <https://sdgs.un.org/>
- The Global Goals for Sustainable Development. Retrieved from: <https://www.globalgoals.org/>
- Sustainable Development Goal Indicators Website: <https://unstats.un.org/sdgs/report/2020>



**Table 3**  
Impact of COVID-19 on SDG-13.

Negative Factors	Explanation
Continuous rise in Global temperature	Global temperature continues to rise due to increase in global emissions. As per the recordings, 2019 was the warmest year. The estimations revealed that the global temperature will rise by upto 3.2 °C by 2100.
Increase in natural disasters	Climate change continues to increase the frequency and severity of natural disasters such as forest fires, droughts, hurricanes, floods.
Higher investments in fossil fuels	The investments in fossil fuels continued to increase as compared to the climate activities during pandemic.
<b>Positive Factors</b>	<b>Explanation</b>
Increased awareness	Amplified awareness among public about the environment and climate change
Developing greener economies	Provides opportunity of reassessing priorities and rebuilding more greener economies in the world
Formulation of green strategies	The UN Secretary-General recommended 6 climate-positive actions: Investments towards accelerating decarbonisation from every aspect; Green and sustainable jobs; Green economies; More investments for sustainable solutions; Handle all climate risks; Cooperation of countries
Formulation of National Adaptation Plans	125 developing countries undertaken measures for National Adaptation Plans (NAPs) with the aim of adapting themselves to the effect of climate change
Development of disaster risks mitigation strategies	Vigorous efforts are taken by countries addressing the risks of COVID-19 crisis by integrating strategies of disaster risk reduction with biohazard risk management at national levels and local levels
Recovery plans	Implementing recovery plans for global sustainable economies

Source:

- UN (United Nations) website: [www.un.org](http://www.un.org)
- Division for Sustainable Development Goals (DSDG). The United Nations Department of Economic and Social Affairs (UNDESA). Retrieved from: <https://sdgs.un.org/>
- The Global Goals for Sustainable Development. Retrieved from: <https://www.globalgoals.org/>
- Sustainable Development Goal Indicators Website: <https://unstats.un.org/sdgs/report/2020>

**Table 4**  
Rating Scale Used.

Scale	Explanation	Scale	Explanation	Scale	Explanation
1	Equal Importance	4	Moderate Plus	7	Very Strong Importance
2	Weak	5	Strong Importance	8	Very, Very Strong Importance
3	Moderate Importance	6	Strong Plus	9	Extreme Importance

**Table 5**  
Net impact of COVID-19 on SDG 7.

Negative Impacts of COVID-19 on SDG7	Severity	Importance	Score
Higher need of energy	0.22	4	0.88
Disturbances in supply chains	0.18	3	0.54
Reduced electricity demand	0.16	3	0.47
Non-affordability to basic energy services	0.14	2	0.28
<b>Total</b>			<b>2.17</b>
Positive Impacts of COVID-19 on SDG7	Severity	Importance	Score
Increased use of renewable energy	0.84	4	3.35
Lower base lending rates	0.15	3	0.45
<b>Total</b>			<b>3.80</b>
<b>Net Score for SDG7</b>			<b>1.63</b>

**Table 6**  
Net impact of COVID-19 on SDG 9.

Negative Impacts of COVID-19 on SDG 9	Severity	Importance	Score
Industrial slowdown	0.19	4	0.75
Income losses	0.10	3	0.31
Lower MSMEs performance	0.12	3	0.35
Economic slowdown	0.46	4	1.83
Vulnerable supply chains	0.06	3	0.19
<b>Total</b>			<b>3.44</b>
Positive Impacts of COVID-19 on SDG9	Severity	Importance	Score
Reduction in emissions	0.24	4	0.95
Resilient industries	0.32	4	1.27
Role of SMEs on economic development	0.16	3	0.49
Increased investment in R&D	0.11	3	0.34
Higher use of technologies	0.09	3	0.28
Improved infrastructure	0.06	2	0.12
<b>Total</b>			<b>3.46</b>
<b>Net Score for SDG9</b>			<b>0.02</b>

**Table 7**  
Net impact of COVID-19 on SDG 13.

Negative Impacts of COVID-19 on SDG13	Severity	Importance	Score
Continuous rise in Global temperature	0.57	4	2.27
Increase in natural disasters	0.32	4	1.26
Higher investments in fossil fuels	0.11	3	0.32
<b>Total</b>			<b>3.85</b>
Positive Impacts of COVID-19 on SDG13	Severity	Importance	Score
Increased awareness	0.05	2	0.10
Developing greener economies	0.39	4	1.57
Formulation of green strategies	0.25	4	1.02
Formulation of National Adaptation Plans	0.11	4	0.45
Development of disaster risks mitigation strategies	0.11	3	0.32
Recovery plans	0.08	3	0.24
<b>Total</b>			<b>3.70</b>
<b>Net Score for SDG13</b>			<b>-0.15</b>

**Table 8**  
Analysis of the impact of COVID-19 on SDGs 7, 9, and 13.

SDG	Net Impact Score	Progress	Analysis	Recommendations
SDG 7	1.63	↑	<ul style="list-style-type: none"> <li>The progress of SDG 7 is not much impacted</li> </ul>	Need to focus on recovery plans to boost the deployment of renewable based technology
SDG 9	0.02	=	<ul style="list-style-type: none"> <li>Negative impact of COVID 19 can be observed</li> <li>The stagnant progress of SDG 9</li> </ul>	Increased Investments in R&D at a higher speed to cope with crisis like pandemic
SDG 13	-0.15	↓	<ul style="list-style-type: none"> <li>Negative Impact of COVID-19 is more on the SDG 13</li> <li>Reverse impact of COVID-19</li> </ul>	<ul style="list-style-type: none"> <li>More actions are required to neutralize the negative impact</li> <li>Rigorous efforts should be taken by the countries to address the risks of crisis like COVID19 by integrating strategies of disaster risk reduction</li> <li>Reassessing the priorities and rebuilding greener economies in the world.</li> </ul>

ment and/or renewable energy. These stakeholders can be categorized as policy makers, industry experts, academia. The AHP questionnaire was circulated to the experts through mail or personal visits. Opinions were sought for pair-wise comparisons among factors and criteria on Satty scale as shown in Table 4. Following questions were asked while using the AHP process.

1. “How much Criteria C\_1 is preferred over C\_2?”
2. “How much Negative Impact of factor A is severe than factor B, with respect to Criteria C\_1?”

After identifying the severity, the next step was to assess the importance of the impacts identified under each SDG. For this 4-point Likert scale was used, where 1 indicates least important and 4 indicates highly important. Experts were asked to rate each impact for the SDG under consideration using the 4-point Likert scale provided to the expert.

The next step after assessing the importance of each impact identified, is to calculate the individual by multiplying the severity and importance of each impact. These scores indicate the individual impact on SDG under consideration. Finally, a net score for each SDG is obtained by subtracting the negative impact from the positive impact. Table 5 Table 6 and Table 7 show the results obtained after using AHP process to assess the severity of each impact identified under each SDGs, importance of each impact, and net score of individual SDG.

**4. Results & discussions**

The net score obtained for SDGs 7, 9, and 13 are 1.63, 0.02, and -0.15, respectively. The net score for SDG 7 indicates that the progress of SDG is not much due to the onset of pandemic as the score is still positive for SDG7. However, if more actions are not taken to improve the progress of this SDG, the goal of the SDG might get jeopardized. Therefore, there is need to focus on recovery plans

to boost the deployment of renewable based technologies. For SDG-9, the progress is observed to be stagnant as the negative impact of COVID-19 can be observed on this SDG. There is an urgent need to take positive actions such as increased investments in R&D is required to improve the overall progress of the SDG. Unexpectedly, the progress of SDG 13 was recorded as negative indicating that this SDG is highly impacted by the pandemic. For this SDG more actions are required to neutralize the effect of impact of pandemic on SDG 13. Rigorous efforts should be taken by the countries to address the risks of crisis like COVID19 by integrating strategies of disaster risk reduction. Also, there is a need to reassess the priorities and rebuilding greener economies in the world. Table 8 summarizes the impact of pandemic on SDGs 7, 9, and 13. The table also summarizes the suggestions to reduce the negative impact of COVID-19 on SDGs so as to improve their overall progress.

**5. Conclusions and suggestions**

With the advent of COVID-19 crisis, the aspirations to achieve 2030 agenda for sustainable development has been jeopardized. It is, therefore, important to assess the impact of the pandemic on the progress of the SDGs. A few studies in the academic literature have discussed about the impacts of the pandemic on the SDGs. However, no study has quantified the impacts of the pandemic on the SDGs. This study, therefore, fills this gap and assesses the impact of COVID-19 on the SDGs. To limit the scope of the study, this study focusses on only environment and energy related SDGs only. The study has observed that the pandemic has bot negative as well as positive impact on the SDG. This observation is also supported by one of the studies conducted in the literature. Therefore, the study has identified both positive and negative impacts of the pandemic on the SDG under consideration. The overall impact is calculated by how much severe/strong is the impact and how

much important is the impact for the SDG under consideration. To assess the severity of the impact AHP process is used and to assess the importance of impact for the SDG under the study, 4-point Likert scale is used. Finally, a net score is calculated using severity and importance of the impacts identified. Based on the results obtained, there is very less impact on SDG 7, there is stagnant progress for SDG 9, and there is negative impact of the pandemic on SDG 13. It is suggested that more actions are required for SDG 13 as compared to SDG 7 and SDG 9. Since there is still not sufficient data to quantify this impact on the world, hence, this study is conceptual and mostly based on subjective information, expert's knowledge and prediction.

### CRedit authorship contribution statement

**Roopali Fulzele:** Conceptualization, Writing – original draft.  
**Vijayta Fulzele:** Methodology. **Mridul Dharwal:** Supervision, Investigation.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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