

# The influence of COVID-19 on the transition to a more circular economy in oil-exporting countries

*Erjan Akhmedov*<sup>1\*</sup>, *Yerzhan Mukashev*<sup>1</sup>, and *Askar Akhmedov*<sup>2</sup>

<sup>1</sup>Kazakh-British Technical University, Business School, 050000 Almaty, Kazakhstan

<sup>2</sup>York University, The Schulich School of Business, ON M3J 1P3 Toronto, Canada

**Abstract.** The present study has attempted to systematically explore the impact of the COVID-19 pandemic on transitioning to a more circular economy in 15 major oil-exporting countries. These countries are being explored because they deliver the highest environmental impact. Apart from the comprehensive literature review, the authors interviewed the group of 32 individuals having sufficient knowledge on the subject. The respondents provided their opinions on the main challenges that impacted the move to a more circular economy in oil-exporting countries during the COVID-19 pandemic, addressed the reasons for these challenges and suggested ways to respond to them. The consensus among the respondents was that the pandemic has slowed the transition process down and there is an urgent need to resume it. Their opinions on other topics were different, but not contradicting. Also, in addition to the frequently discussed topics, the respondents addressed those usually insufficiently considered, namely the pursuit of a luxurious lifestyle and scepticism towards relevant concepts and policies in many countries under consideration. The paper finishes with a set of recommendations aimed at early resumption and intensification of efforts on transitioning to a more circular economy in oil-exporting countries.

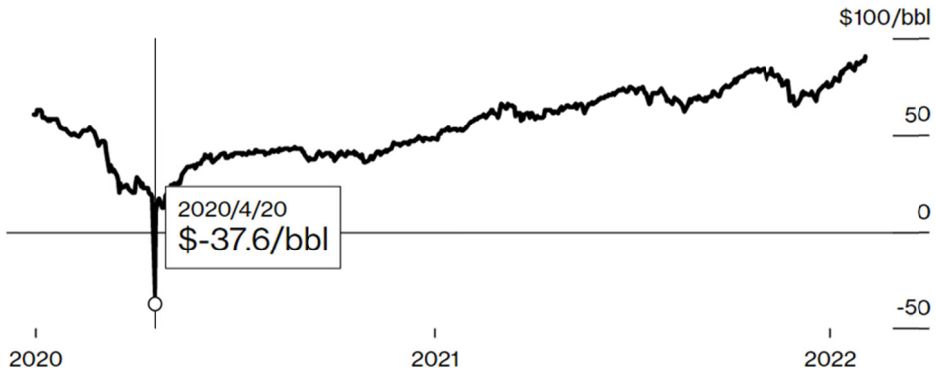
## 1 Introduction

The COVID-19 pandemic has negatively affected all spheres of human life including the transition to a circular economy (CE). As indicated in [1] “the Circularity Gap got worse, not better. In the six years between headline-grabbing climate conferences (in Paris and Glasgow), the global economy consumed 70% more than what the Earth can safely replenish”. This is a warning sign, which calls for immediate actions. In oil-exporting countries (OECs) the transition to a more CE suffered because as reported [2]: “The double blow of Coronavirus (COVID-19) and the oil price shock is hitting oil-exporting developing countries particularly hard”. This double blow deteriorated revenues of these countries and diverted the public attention to more urgent at that point in time needs.

---

\* Corresponding author: [e.akhmedov@kbtu.kz](mailto:e.akhmedov@kbtu.kz)

In [3] it is advised that “The pandemic price crash was unlike anything seen before in the industry” and this is clearly shown on Figure 1 below.



**Fig. 1.** West Texas Intermediate (WTI) crude oil prices during the COVID-19 pandemic [3].

The first question, which can arise, is why to consider the OECs separately? The answer is that it is logical to pay specific attention to the countries, which deliver the highest environmental impact. This is clearly demonstrated in Table 1. Another reason is that these countries have a lot in common. The selection of countries is further described in the methodology and data section below.

**Table 1.** National Ecological Footprint and Biocapacity Accounts for Selected Oil-Exporting Countries in 2018.

No	Country	Bio capacity, gha	Ecological Footprint, gha	Surplus or deficit, gha	Population, m	Total deficit or reserve, gMha
1	Saudi Arabia	0.4	5.0	-4.6	33.7	-155.02
2	Russia	6.7	5.3	1.4	144.5	202.3
3	Canada	14.7	8.1	6.6	37.1	244.86
4	Iraq	0.2	1.8	-1.6	38.4	-61.44
5	UAE	0.5	8.1	-7.6	9.6	-72.96
6	USA	3.4	8.1	-4.7	326.8	-1535.96
7	Norway	6.9	5.7	1.2	5.3	6.36
8	Kuwait	0.5	7.9	-7.4	4.1	-30.34
9	Nigeria	0.7	1.1	-0.4	195.8	-78.32
10	Brazil	8.6	2.6	6.0	209.5	1257
11	Libya	0.6	3.3	-2.7	6.7	-18.09
12	Angola	1.8	0.9	0.9	30.8	27.72
13	Oman	1.4	6.3	-4.9	4.8	-23.52
14	Mexico	1.2	2.4	-1.2	126.2	-151.44
15	Kazakhstan	3.6	5.0	-1.4	18.3	-25.62
Total						-414.47

Source: based on [4 - 6].

As shown in Figure 1 above, the pandemic negatively affected the crude oil prices up to the level when they even became negative (in April 2020). Certainly, this happened for a very short period, but this unprecedented negative price shock had a major psychological effect and raised concerns about the ability of these countries to execute their budget commitments.

These concerns were not ungrounded as falling crude oil prices seriously deteriorated revenues of the considered countries. The decreased revenues in turn affected the ability of these countries to execute CE policies and programs. Discussing the topic of this article, it is appropriate to acknowledge several issues associated with it. The first is that the less-developed OECs generally receive less attention of academic community than the oil-importing countries or the developed OECs. Another issue is that the CE concept is less popular in the less-developed OECs again in comparison with the oil-importing countries or the developed OECs. This point is expanded in the Literature review section. And the third issue is that we are not sure that the pandemic has come to an end. New pandemic crisis developments, which will significantly affect the OECs and their transition to a more CE, are possible.

## 1.1 Research objectives

The proposed research is aimed at:

- (i) studying challenges that impacted the move to a circular economy in oil-exporting countries during the COVID-19 pandemic;
- (ii) studying the reasons for these challenges; and
- (iii) offering policy recommendations to respond to these challenges.

This research is a part of a bigger project aimed at studying challenges of transitioning to the CE in the OECs and the ways to respond them.

## 2 Literature review

### 2.1 The impact of the COVID-19 pandemic and oil price declines associated with it on the economies of the OECs

Given the strong dependence of the considered countries to oil price movements, several researchers attempted to study the combined impact of the COVID-19 pandemic and oil price declines on the economies of these countries. Among the first scientific works, which should be mentioned in this context are the following: in [2] the vulnerability of some OECs to the “double blow of Coronavirus (COVID-19) and the oil price shock” was assessed. The authors further acknowledged that “although some countries might weather the current crisis on the back of sovereign wealth funds or relatively low public debt levels, this will not be the case for the majority of fragile oil-exporting countries, many of which are resource dependent and were already grappling with high levels of debt and multifaceted economic and social fragility before the present crisis.” Another manuscript that explored the influence of COVID-19 at an early stage was [7]. This study provided “some preliminary estimates about the behaviour of oil-stock nexus during COVID-19 pandemic.” In [8] the dual effect of the COVID-19 pandemic and collapse in oil prices on education in Nigeria is considered. These researchers include [9] who portrayed “recent commodity price developments and underlying drivers” and discussed “implications for commodity-dependent countries, including the risks of depressed export earnings and of changing global production patterns in the long run”.

Later the attempts to study the above-mentioned combined impact were continued by such scientists as [10] who examined “the factors underlying the historic oil price fluctuation during the COVID-19 pandemic”, [11] who investigated “effects of the unprecedented oil price declines and substantial COVID-relief packages on Gulf economies”. Paper [12] re-examined “the performances of stock prices, oil prices and exchange rates in twelve oil exporting countries amidst the ravaging consequences of the ongoing worldwide coronavirus pandemic”.

## **2.2 CE perception in the OECs and the policies required to promote it**

As mentioned in Introduction, the CE concept is less popular in the considered countries (in comparison with the oil-importing ones). In [13] it is noticed that “Without meaningful dialogue at the national and international level around future growth pathways, there is a risk that natural resource-exporting countries will see the CE not as an opportunity for economic diversification but as a threat to continued growth.” Unfortunately, the World has not seen such a dialogue yet. In [14] it is attempted to understand “public awareness and attitudes to CE transition in Saudi Arabia... through a questionnaire survey distributed to 402 residents of the Dammam Metropolitan Area.” They found that “the respondents had little understanding of the CE concept due to limited awareness of the topic.” Moreover, we can talk even about the scepticism towards the discourse on CE, which is widespread in the considered countries, and this point of view is shared by many scientists. Here we can mention [15 - 16] and several others mentioned below.

In [17] it is emphasized on the need of “cooperative international efforts mobilizing both fossil fuel consumers and producers need to promote ‘just transition’ policies that increase support for a green shift among fossil fuel companies and producing countries, including fossil fuel exporters.” In [18] the authors aimed “to examine the volatility in the domestic credit provided to the private sector due to oil shocks and the COVID-19 pandemic across countries.” In [19] it was made an interesting observation that “COVID-19 is clearly a short-term phenomenon that would have less effect on the renewable energy growth trend in the long term. Yet when the world returns to the regular routine, there will always be a great deal of concern in renewable energy.” In [20] the authors addressed Azerbaijan and Kazakhstan as “the most oil-dependent countries in the Caspian Sea region.” They revealed that the correlation between crude oil prices and the exchange rates in these countries became “stronger during the COVID-19 pandemic.” Other authors who studied similar issues include [21 - 23].

The authors would like to refer to [24]. In this article, the authors admit that “given that implementation of CE is costly for consumers and companies, the political intervention has a leading role in this initial phase also in disseminating a positive and sustainable image of CE concept and model.” This point of view is supported by [25] “the adoption of the CE is an arduous task that requires all economic agents’ effort, especially government leadership, to apply measures that force firms to adopt cleaner production systems” and by [26] “The post-COVID-19 investments needed to accelerate towards more resilient, low carbon and circular economies should also be integrated into the stimulus packages for economic recovery being promised by governments”. Paper [27] also confirmed that “civil responsibility actions and practices (aimed at transitioning towards more circular economy) are costly” and advised that political intervention is required though “an active role and a higher responsibility of the consumers and companies is essential to assure that the political intervention occurs according to the social, environmental and economic goals”.

## **2.3 Attempts to consider groups of the OECs**

Several scientists investigated not single countries, but groups of the OECs. In [28] the authors attempted to “examine the potential for circularity in the EUR (Energy, Utilities and Resources) sector – specifically in Oil and Gas – in GCC (Gulf Cooperation Council) nations, the benefits circularity could bring to EUR companies and outline the six steps that organisations can take to set themselves on the road to a circular economy strategy”. The study [29] urged G-20 (a strategic multilateral platform connecting the world’s major developed and emerging economies) to “align COVID-19 recovery measures with resource efficiency objectives”.

This is especially important for the World because as the same source informs “G20 countries account for approximately 75% of global materials use and 80% of global greenhouse gas emissions”. These countries as a group were also considered in [30]. The study [31] concluded that “GCC countries should speed up the renewable energy transition process by installing renewable energy projects on an urgent basis, which would reduce the environmental consequences of rising oil price and economic growth”. It is worth pointing out that many OECs are the members of the Organization for Islamic Cooperation (OIC). So, in [32] the authors identified “four key economic challenges faced by the OIC countries: challenges in adapting to new normal in re-starting the economic activities; issues in formulating effective plans for economic recovery; increase in poverty, unemployment and inequality in societies; and disruption to global economy chains.” Then they proposed recommendations to overcome these economic challenges.

## **2.4 Issues associated with COVID-19**

A significant factor, which complicated the continuation of pre-COVID-19 policies and programs became the ambiguity. It, as well as its coping mechanisms, were studied by [33] using the example of supply chains, which are of serious importance for the countries under consideration. A comprehensive analysis of “74 articles that addressed supply chain issues arising from COVID-19” was performed in [34]. The authors of [35] analyzed “the impacts and solutions in response to the COVID-19 pandemic, which contributes to the development and formulation of strategies to strengthen the resilience of maritime transport.” The maritime transport is by far the biggest mean of transport for crude oil representing about 60% of the world total. Another area, which attracted attention of scientific community, was incentives to enable a more circular, low-carbon economy. The study [36 - 37] paid particular importance to the incentives aimed at pushing for acceptance and adoption of circular solutions. Here we need to remember, and in [13], it is particularly underlined that “price volatility continues to provide an important incentive – for resource-importing and exporting countries alike – to pursue less resource-intensive economic pathways”.

Discussing the transition to circularity issue, it is important to acknowledge that such essential aspects of CE as reuse of products, sharing of underused assets, repairing, recycling and remanufacturing have to be better propagated and promoted. Among the studies which support this viewpoint are [38 - 39]. A significant, but often overlooked phenomenon became mentality, especially the pursuit of luxurious lifestyle. All the interviewees (words “respondent” and “interviewee” are used interchangeably throughout this text) agreed on this viewpoint. It is also confirmed by some authors. For example, in [36] it was observed that “cultural barriers are a significant factor hindering the diffusion of so-called ‘circular’ business models, particularly the lack of consumer – or user – acceptance”. Among other manuscripts which studied this area are [40 - 41]. In general, the authors admit that the literature body on this topic is limited (and this was repeatedly confirmed by our respondents). This fact demonstrates that there is the knowledge gap to be filled.

## **3 Methodology and data**

The present study was designed to achieve the objectives stated in point 1.1 in above. It is a qualitative one. The qualitative method was chosen because it provides the best results for our research objectives. Our study used literature review along with semi-structured interviews as research methods and involved the following main steps:

- (i) Gathering information by reviewing the relevant literature.
- (ii) Gathering information through a series of in-depth semi-structured interviews.

(iii) Transcribing, checking and cross-checking the answers received during the interviews.

(iv) Analysing the answers received during the interviews and the information collected through the literature review.

(v) Summarizing the information gathered and drawing conclusions.

The list of respondents is given in Appendix. The number of respondents is relatively small, and this is explained by the nature of our research. Initially we approached 81 individuals, paying due attention to pre-screening potential interviewees. However, 49 out of 81 either declined to participate or demonstrated very limited knowledge on the subject matter. Finally, we interviewed the group of 32 individuals from the OECs or having deep knowledge of the situation in these countries. They worked for government agencies, international and non-governmental organizations, and academia during the period from 3 November 2021 to 14 July 2022 – the period during which we conducted the interviews. We made every endeavor to ensure proper professional and geographic representation of interviewees with the main goal to obtain unbiased and comprehensive responses. Some respondents preferred not to disclose their identity. They contemplated that their answers can be sensitive to their clients or employers (especially in the part related to the mentality). This issue is also mentioned in the research limitations section below. 5 out of 32 interviews were performed face to face. The other 27 took place online (via Teams, Zoom or Skype). The respondents were requested to answer the following open-ended questions:

(i) In your opinion, what are the main challenges (including pandemic-related) the OECs face in transitioning to a more circular economy? List and describe them.

(ii) What are the reasons for these challenges?

(iii) How to respond them? Suggest the ways.

We cross-checked the answers to the 1<sup>st</sup> and 2<sup>nd</sup> questions to make sure that they are trustworthy. The answers to the 3<sup>rd</sup> question represent personal opinions, so they were not cross-checked. In some cases, the respondents were requested to provide their opinions on the answers given by others. Several clarification calls were made when required.

As mentioned above, this research is a part of a larger project focused on studying challenges of transitioning to the CE in the OECs and the ways to respond them. The respondents cited earlier were initially requested to answer the questions related to the general questions. However, the overall COVID-19 environment made all the respondents to repeatedly refer to topics related to the COVID-19 pandemic and its influence on the transition of OECs to a circular economy. The authors then decided to study COVID-19 related challenges separately.

### **3.1 Selection of countries**

Since it is not possible to consider all the OECs within the confines of this article, the authors took the 15 biggest oil-exporters listed in Table 1 above as a basis for further consideration. As reports [4], which compiled this list, “By value, the listed 15 countries shipped 76.7% of globally exported crude oil in 2021.” We then addressed their ecological footprint, biocapacity and surplus or deficit.

As it is illustrated in Table 1 above, only 5 out of 15 the biggest OECs have biocapacity reserves. Moreover, the total deficit of these countries is substantial. One can doubt whether it is possible to group so different countries together. The answer is that this has already been done by many researchers including [42 - 44] and many others. The authors were planning to consider developing countries separately. However, the challenges reported by representatives of developed countries appeared to be quite similar with those reported by representatives of developing ones. Another important consideration was the huge total biocapacity deficit of the USA shown in Table 1.

## 4 Empirical results and discussion

The consensus among the interviewees was that the pandemic has slowed the transition process down and there is an urgent need to resume it. Their opinions on other topics were sometimes different, but not contradicting. The list of pandemic-related challenges looks impressive. This became one more inducement for writing this paper (Table 2).

**Table 2.** Pandemic-related challenges.

No	Major challenges identified	Comments made by interviewees or found in literature sources
1	Public administration: (i) The pandemic deflected the attention of OEC' governments and general public from the CE agenda. (ii) Actual discontinuation or decreased financing of CE-related programs and projects.	This was the first type of challenges remembered by all the interviewees. The respondents advised that in the situation of complete uncertainty, which prevailed at the beginning of the pandemic the move to concentrate limited resources was understandable. However, the need to move towards the CE remains and there is an urgent need to return to the pre-COVID-19 CE agenda.
2	Economic: (i) Economic decline and revenue losses worldwide. (ii) Disruption of supply chains worldwide.	(i) The strong dependence of OECs on oil revenues made them particularly vulnerable to the challenges of this type. (ii) Supply chain resilience has been a debate for quite some time, i.e., in [10] it was underlined that "price volatility continues to provide an important incentive – for resource-importing and -exporting countries alike – to pursue less resource-intensive economic pathways." In this regard, in [45] it was stated that "support from governments... is particularly essential". The pandemic added incentives to shift to a CE.
3	Oil market disruptions of economic and non-economic nature: global oil demand decline and oil price wars.	Though closely related to the previous type, there is a need to separate these challenges as the oil market disruptions were caused by the combination of both economic and non-economic factors, each having serious impact on economic and financial stability of the OECs.
4	Environmental: (i) Negative impact of COVID-19 on the environmental NGOs activities. (ii) Tons of pandemic-associated wastes.	(i) Three representatives of environmental NGOs admitted that their activities largely slowed down. On one hand this happened because of quarantine measures. On the other hand, because of the deflected attention of OEC' governments and general public mentioned above. (ii) Used PPE (personal protective equipment) management has become a real problem for the entire World and the OECs are not an exception. An academic study of this topic in one of the OECs was described in [46]

## 5 Reasons for challenges

The main reasons for challenges are:

(i) Mentality, especially the absence of democracy and the pursuit of luxurious lifestyle in some of the countries under consideration. All the interviewees agreed that this public attitude is constraining the shift to a more circular economy. This viewpoint is confirmed by several literature sources cited above.

(ii) Scepticism towards CE concepts and policies, especially in poorer OECs. The encouraging fact is that this behavioral pattern started to change, and younger generations became way more receptive to the need to shift to a more circular economy. Here, we would like to emphasize that this and the previous points are also rooted in insufficient public awareness.



(iii) Poor population in several considered countries. The point made by some interviewees is that the widespread perception of the OECs as rich countries is wrong. One of the biggest oil-exporters Angola is even in the United Nations list of least developed countries (<https://unctad.org/topic/least-developed-countries/list>). Such countries as Iraq, Libya and Nigeria also do not demonstrate high living standards though due to different reasons. In addition to the simple lack or absence of funds to finance CE programs, poverty generates another misconception: people from poorer countries sometimes perceive the concept of transition to a more CE as not related to them, as something for rich countries with developed manufacturing industries. The respondents representing international organizations and international financial institutions particularly supported this judgement.

(iv) Insufficient educational levels in some OECs. This circumstance translates into low awareness. To a large extent, this is the consequence of the previous point. It was confirmed by several authors including of [8] and [47] who pointed out at “the negative effect of rents on the quality of education” and educational level in the considered countries. Comments made in this regard by the respondents were quite similar. However, in addition to the majority of answers, which supported this viewpoint, several interviewees started general discourse that more depends on personality rather than country of origin. Some others openly stated that they cannot comment due to political and self-censoring reasons.

(v) Cheap inputs. In general energy prices in these countries are quite low. For example, average octane 95 gasoline price as of 20 June 2022, US\$/liter: Kuwait – 0.34, Nigeria – 0.41, Saudi Arabia – 0.62. For comparison, oil-importing countries’ gasoline prices for the same period are as follows: China – 1.49, Germany – 1.85, Italy – 2.17 [48].

(vi) Cheap goods and high costs of repairs. As a result, the cost of repairs is often similar to the cost of new items. This topic has a broad coverage in the scientific literature (described above). It has also generated numerous interviewees’ comments. All these comments reiterated the point that costs of repairs are often prohibitive. Two respondents (one from Kazakhstan and another one from the UAE) gave examples that in their cases the suggested costs of repair (of a vacuum cleaner and an electric grill) even exceed the cost of new items.

## 6 Conclusions and recommendations

The following conclusions and recommendations were suggested:

(i) There is a need to retain the pre-pandemic dynamics of transitioning to a more CE, to safeguard the already made progress, and avoid future delays.

(ii) It is important to reconsider the situation to better understand what is needed to be changed. Here it is essential to bear in mind that the pre-pandemic agenda continues to be very relevant.

(iii) The present period of high oil prices is creating the right moment for investments into CE projects.

(iv) It is important to preserve and promote those business practices emerged during the COVID-19 pandemic that are in line with CE principles. Examples include online shopping, telecommuting, telework, e-learning etc.

(v) Raising public awareness remains highly relevant for the transitioning towards a more CE.

(vi) It is essential to ensure proper information exchange of the best practices in transitioning to a more CE among the OECs.

(vii) Not less important is the continuation of government support for encouraging CE efforts. There is a need to integrate CE elements in the form of investments and other incentives into state COVID-19 recovery programs.



## 6.1 Research contributions

The main research contributions are:

(i) The present research is among the first and very few, which study challenges that impacted the move to a circular economy in oil-exporting countries during the COVID-19 pandemic and their reasons. As mentioned above, the literature body on this topic is very limited. Existing research on this topic has primarily focused on oil-importing countries.

(ii) Our research is also among the first and very few, which suggests policy recommendations to respond to these challenges.

## 6.2 Research limitations

The main limitations of the research are:

(i) Self-reported data: as explained earlier, we addressed this limitation through cross-checking the answers and making clarification calls to ascertain the responses.

(ii) Small sample size: this limitation is caused by the nature of our research. As mentioned in the Methodology and data section above, the overall number of people with proper understanding both circular economy and general socio-economic situation in the OECs is limited. The authors, however, tried their best to increase their number as much as possible.

(iii) Refusal to comment on some issues due to political and/or self-censoring reasons.

## Appendix

List of Respondents (Total 32):

(i) 4 former and current government executives (Azerbaijan, Kazakhstan, Qatar and Russia).

(ii) 8 representatives of academia (Azerbaijan, Canada, Iraq, Kazakhstan, Mexico, the UAE, the USA, the UK).

(iii) 4 representatives of environmental NGOs (Canada, Norway, Kazakhstan and Russia).

(iv) 5 staff members of international organizations (United Nations' organizations).

(v) 2 senior managers of international law firms.

(vi) 6 representatives of international financial institutions (Asian Development Bank, European Bank for Reconstruction and Development, Islamic Development Bank and the World Bank).

(vii) 3 senior managers of international consulting companies.

The authors are thankful to Dr. Murat Akpınar, Principal Lecturer at the JAMK University of Applied Science, Finland for his invaluable advice, which substantially improved the quality of our article.

## References

1. Circle Economy. (2022). The Circularity Gap Report 2022. <https://www.circularity-gap.world/2022#Download-the-report>
2. Engebretsen, R., & Anderson, C. (2020). The impact of Coronavirus (COVID-19) and the global oil price shock on the fiscal position of oil-exporting developing countries (OECD Policy Responses to Coronavirus (COVID-19)). The Organisation for Economic Co-operation and Development (OECD). <https://doi.org/10.1787/51eb6df1-en>

3. Bloomberg. (2022). How the World Went From -\$40 to Nearly \$100 For Crude Oil. Oil Prices. <https://www.bloomberg.com/news/articles/2022-02-16/oil-prices-near-100-as-global-economy-struggles-to-balance-post-covid-crash>
4. World's Top Exports. (2022). Crude Oil Exports by Country 2021. WTEEx. <https://www.worldstopexports.com/worlds-top-oil-exports-country/>
5. Network, Global Footprint. (2022). National Ecological Footprint and Biocapacity Accounts. Open Data Platform. <https://data.footprintnetwork.org/#/>
6. The World Bank. (2018). Total Population. World Bank Data. <https://data.worldbank.org/indicator>
7. Salisu, A. A., Ebuh, G. U., & Usman, N. (2020). Revisiting oil-stock nexus during COVID-19 pandemic: Some preliminary results. *International Review of Economics & Finance*, 69, 280–294. <https://doi.org/10.1016/J.IREF.2020.06.023>
8. Obiakor, T. (2020). Why COVID-19 and oil prices threaten education in Nigeria. *World Economic Forum*. <https://www.weforum.org/agenda/2020/07/what-covid-19-means-for-the-shrinking-fiscal-space-for-education-in-nigeria/>
9. Tröster, B., & Küblböck, K. (2020). Unprecedented but not Unpredictable: Effects of the COVID-19 Crisis on Commodity-Dependent Countries. *European Journal of Development Research*, 32(5), 1430–1449. <https://doi.org/10.1057/S41287-020-00313-9/FIGURES/2>
10. Le, T. H., Le, A. T., & Le, H. C. (2021). The historic oil price fluctuation during the Covid-19 pandemic: What are the causes? *Research in International Business and Finance*, 58, 101489. <https://doi.org/10.1016/J.RIBAF.2021.101489>
11. Shehabi, M. (2022). Modeling long-term impacts of the COVID-19 pandemic and oil price declines on Gulf oil economies. *Economic Modelling*, 112, 105849. <https://doi.org/10.1016/J.ECONMOD.2022.105849>
12. Kumeka, T. T., Uzoma-Nwosu, D. C., & David-Wayas, M. O. (2022). The effects of COVID-19 on the interrelationship among oil prices, stock prices and exchange rates in selected oil exporting economies. *Resources Policy*, 77(102744). <https://doi.org/10.1016/j.resourpol.2022.102744>
13. Preston, F., Lehne, J., & Wellesley, L. (2019). An Inclusive Circular Economy: Priorities for Developing Countries.
14. Almulhim, A. I., & Abubakar, I. R. (2021). Understanding Public Environmental Awareness and Attitudes toward Circular Economy Transition in Saudi Arabia. *Sustainability*, 13(18), 10157. <https://doi.org/10.3390/SU131810157>
15. Black, J. E., Kopke, K., & O'Mahony, C. (2019). Towards a Circular Economy: Using Stakeholder Subjectivity to Identify Priorities, Consensus, and Conflict in the Irish EPS/XPS Market. *Sustainability*, 11, 11(23), 6834. <https://doi.org/10.3390/SU11236834>
16. Szilagyi, A., Cioca, L.-I., Bacali, L., Lakatos, E.-S., & Birgovan, A.-L. (2022). Consumers in the Circular Economy: A Path Analysis of the Underlying Factors of Purchasing Behaviour. *International Journal of Environmental Research and Public Health*, 19 (18), 11333. <https://doi.org/https://doi.org/10.3390/ijerph191811333>
17. Le Billon, P., Lujala, P., Singh, D., Culbert, V., & Kristoffersen, B. (2021). Fossil fuels, climate change, and the COVID-19 crisis: pathways for a just and green post-pandemic recovery. *Climate Policy*, 21(10), 1347–1356. <https://doi.org/10.1080/14693062.2021.1965524>

18. Anser, M. K., Khan, M. A., Zaman, K., Nassani, A. A., Askar, S. E., Abro, M. M. Q., & Kabbani, A. (2021). Financial development, oil resources, and environmental degradation in pandemic recession: to go down in flames. *Environmental Science and Pollution Research*, 28(43), 61554–61567. <https://link.springer.com/article/10.1007/s11356-021-15067-y>
19. Priya, S. S., Cuce, E., & Sudhakar, K. (2021). A perspective of COVID 19 impact on global economy, energy and environment. *International Journal of Sustainable Engineering*, 14(6), 1290–1305. <https://doi.org/10.1080/19397038.2021.1964634>
20. Czech, K., & Niftiyev, I. (2021). The Impact of Oil Price Shocks on Oil-Dependent Countries' Currencies: The Case of Azerbaijan and Kazakhstan. *Journal of Risk and Financial Management*, 14(9), 431. <https://doi.org/10.3390/JRFM14090431>
21. Mensi, W., Al-Yahyaee, K. H., Vo, X. V., & Kang, S. H. (2021). Modeling the frequency dynamics of spillovers and connectedness between crude oil and MENA stock markets with portfolio implications. *Economic Analysis and Policy*, 71, 397–419. <https://doi.org/10.1016/J.EAP.2021.06.001>
22. Candila, V., Maximov, D., Mikhaylov, A., Moiseev, N., Senjyu, T., & Tryndina, N. (2021). On the Relationship between Oil and Exchange Rates of Oil-Exporting and Oil-Importing Countries: From the Great Recession Period to the COVID-19 Era. *Energies*, 14(23), 8046. <https://doi.org/10.3390/EN14238046>
23. Shang, J., & Hamori, S. (2021). Do crude oil prices and the sentiment index influence foreign exchange rates differently in oil-importing and oil-exporting countries? A dynamic connectedness analysis. *Resources Policy*, 74, 102400. <https://doi.org/10.1016/J.RESOURPOL.2021.102400>
24. Kevin van Langen, S., Vassillo, C., Ghisellini, P., Restaino, D., Passaro, R., & Ulgiati, S. (2021). Promoting circular economy transition: A study about perceptions and awareness by different stakeholders groups. *Journal of Cleaner Production*, 316. <https://doi.org/10.1016/J.JCLEPRO.2021.128166>
25. Khan, S. A. R., Ponce, P., Thomas, G., Yu, Z., Al-Ahmadi, M. S., & Tanveer, M. (2021). Digital Technologies, Circular Economy Practices and Environmental Policies in the Era of COVID-19. *Sustainability*, 13(22), 12790. <https://doi.org/10.3390/SU132212790>
26. Ibn-Mohammed, T., Mustapha, K. B., Godsell, J., Adamu, Z., Babatunde, K. A., Akintade, D. D., Acquaye, A., Fujii, H., Ndiaye, M. M., Yamoah, F. A., & Koh, S. C. L. (2021). A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies. *Resources, Conservation and Recycling*, 164, 105169. <https://doi.org/10.1016/J.RESCONREC.2020.105169>
27. Ghisellini, P., Passaro, R., & Ulgiati, S. (2021). Revisiting Keynes in the Light of the Transition to Circular Economy. *Circular Economy and Sustainability*, 1(1), 143–171. <https://doi.org/10.1007/S43615-021-00016-1>
28. Achrafi, W. (2021). The rise of circularity: How the GCC is transforming from the inside for the outside.
29. OECD. (2021). Towards a more resource-efficient and circular economy The role of the G20. <https://www.oecd.org/environment/waste>
30. Akhmedov, E., Mukashev, Y., & Akhmedov, A. (2022). Competitiveness of oil-exporting developing and emerging countries and parameters critical for increasing it. *International Journal of Business and Globalisation*, 31(2), 231–249. <https://doi.org/10.1504/IJBG.2022.125978>

31. Mahmood, H., Asadov, A., Tanveer, M., Furqan, M., & Yu, Z. (2022). Impact of Oil Price, Economic Growth and Urbanization on CO2 Emissions in GCC Countries: Asymmetry Analysis. *Sustainability*, 14(8). <https://doi.org/10.3390/SU14084562>
32. Hassan, M. K., Bin-Nashwan, S. A., & Muneeza, A. (2022). OIC Economies during the COVID-19: Implications and Recommendations. In *Towards a Post-Covid Global Financial System* (pp. 37–50). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-80071-625-420210002>
33. Gunessee, S., & Subramanian, N. (2020). Ambiguity and its coping mechanisms in supply chains lessons from the Covid-19 pandemic and natural disasters. *International Journal of Operations and Production Management*, 40(7–8), 1201–1223. <https://doi.org/10.1108/IJOPM-07-2019-0530>
34. Chowdhury, P., Paul, S. K., Kaiser, S., & Mokterdir, M. A. (2021). COVID-19 pandemic related supply chain studies: A systematic review. *Transportation Research Part E: Logistics and Transportation Review*, 148, 102271. <https://doi.org/10.1016/J.TRE.2021.102271>
35. Chua, J. Y., Foo, R., Tan, K. H., & Yuen, K. F. (2022). Maritime resilience during the COVID-19 pandemic: impacts and solutions. *Continuity & Resilience Review*, 4(1), 124–143. <https://doi.org/10.1108/CRR-09-2021-0031>
36. Camacho-Otero, J., Boks, C., & Pettersen, I. N. (2018). Consumption in the circular economy: A literature review. *Sustainability*, 10(8), 1–25. <https://doi.org/10.3390/SU10082758>
37. Schröder, P. (2020). Promoting a Just Transition to an Inclusive Circular Economy. <https://www.chathamhouse.org/sites/default/files/2020-04-01-inclusive-circular-economy-schroder.pdf>
38. Niskanen, J., McLaren, D., & Anshelm, J. (2021). Repair for a Broken Economy: Lessons for Circular Economy from an International Interview Study of Repairers. *Sustainability*, 13(2316), 1–15. <https://doi.org/10.3390/su13042316>
39. Rogers, H. A., Deutz, P., & Ramos, T. B. (2021). Repairing the circular economy: Public perception and participant profile of the repair economy in Hull, UK. *Resources, Conservation and Recycling*, 168(105447). <https://doi.org/10.1016/J.RESCONREC.2021.105447>
40. Hamza, S. (2015). Migrant Labor in the Arabian Gulf: A Case Study of Dubai, UAE. *Pursuit - The Journal of Undergraduate Research at The University of Tennessee*, 6(1). <https://trace.tennessee.edu/pursuit/vol6/iss1/10>
41. Semaan, R. W., Lindsay, V., Williams, P., & Ashill, N. (2019). The influence of gender roles in the drivers of luxury consumption for women: Insights from the gulf region. *Journal of Retailing and Consumer Services*, 51, 165–175. <https://doi.org/10.1016/J.JRETCONSER.2019.06.006>
42. Agency, I. E. (2018). World Energy Outlook Special Report Outlook for Producer Economies What do changing energy dynamics mean for major oil and gas exporters? <https://iea.blob.core.windows.net>
43. Erdoğan, S., Yıldırım, D. Ç., & Gedikli, A. (2020). Relationship Between Oil Revenues and Education in Gulf Cooperation Council Countries. *International Journal of Energy Economics and Policy*, 10(1), 193–201. <https://doi.org/https://doi.org/10.32479/ijeep.8653>

44. Fujiwara, N., Rizos, V., & Ferrer, J. N. (2021). Study on Circular Economy developments in the GCC region and opportunities for collaboration with the European Union. <https://www.ceps.eu/wp-content/>
45. Akhmedov, E. (2021). Rail deliveries of bulk oil cargoes from the caspian region to europe. *Acta Logistica*, 8(2), 165–173. <https://doi.org/10.22306/al.v8i2.220>
46. Eze, W. U., Oyegoke, T., Gaiya, J. D., Umunakwe, R., Onyemachi, D. I., (2022). Review of personal protective equipment and their associated wastes, life-cycle and effective management during the Covid-19 pandemic in developing nations. *Clean Technologies and Recycling*, 2(1), 1–31. <https://doi.org/10.3934/CTR.2022001>
47. Farzanegan, M. R., & Thum, M. (2017). More Oil, Less Quality of Education? New Empirical Evidence. CEPIE Working Paper, 09/17. <https://doi.org/10.13140/RG.2.2.36794.49608>
48. GlobalPetrolPrices.com. (2022). Gasoline prices around the world. [https://www.globalpetrolprices.com/gasoline\\_prices/](https://www.globalpetrolprices.com/gasoline_prices/)