

A Perspective to Carbon Footprint in the Economic Justice Context

Adina Țiței

"Ovidius" University of Contanta, Faculty of Economic Sciences, Romania

adinatitei@yahoo.com

Abstract

Starting from the assumption that the world needs a restart, large transformations that ensure the continuity of economic growth, the present research takes into discussion the problem of climate change as a consequence of global greenhouse gas emissions in the context of economic justice. In this perspective, it is necessary to take prompt measures that must take into consideration the moral criterion, to have as goal to correct the deficiencies, the inequalities and to reduce the injustices. Consequently, in this paper we propose to analyse the countries' contribution to the carbon footprint in the last decades, to make comparisons and to highlight the long-term trends of the greenhouse gas emissions.

Key words: carbon footprint, economic justice, CO2 emission

J.E.L. classification: O10, Q53

1. Introduction

The economic crises of the last 50 years have brought to the fore issues of environmental degradation, scarce resources, widening gaps in living standards, and significant increases in unemployment and poverty. Industrialization had a major impact on economic growth when science and technology were widely used in the production of material goods and services. Its successes created the illusion of unlimited growth underpinned by the creative potential of people, which can eliminate the constraints imposed by limited natural resources. The exclusive pursuit of quantity has generated a series of irreversible negative effects and incompatibilities between economic performance and the preservation of the natural environment, and has consequently raised the issue of global measures to limit pollution and generate sustainable growth and development.

The first shock came in the 1970s in the wake of the energy and raw materials crisis, which forced a review of the attitudes towards natural resources, economic growth and environmental degradation. In the decades that followed, international economic debates linked issues of economic growth and development with issues of environment, resource scarcity and air pollution.

World leaders meet regularly to debate these issues and their meetings have always ended with commitments to reduce pollution, increase resource use efficiency and reduce inequalities in development. In June 1972, in Stockholm, participants focused on eco-development, and among the topics discussed were natural resource management and the determination of pollutants of international importance. In the same year, the Club of Rome's report entitled 'Limits to Growth' was published, and the UN set up the World Commission to deal with environmental and development issues. In 1987, the World Commission published the Brundtland report which set clear environmental targets. The 1992 Rio de Janeiro Summit subsequently triggered the global negotiation process on environmental sustainability and adopted the 40-chapter plan and Agenda 21. Then in 1997 in Kyoto the developed countries of the world committed themselves through their representatives to reduce emissions. The Copenhagen summit in 2009 focused on carbon footprints, and the EU took a leading role in tackling the climate change. Also, an important step was the 2015 Paris Agreement which focused on reducing greenhouse gas emissions, climate change and its causes. We also note the work of the European Environment Agency and the signing of environmental management partnerships.

The awareness of environmental issues is growing slowly, although signals from scientists point to a reality that can no longer be ignored, and policymakers meet regularly to debate all this. The position of the world's countries on all these issues is different. While some countries take a limited attitude to environmental protection, others almost ignore the issue. Moreover, some of the latter fear that a new form of totalitarianism in the form of the "green dictatorship" or the "green barrier" will be established, because they lack the financial and material resources to achieve sustainable development (Soroceanu, 2000).

2. Literature review

Climate change and economic pressure on the environment are undeniable phenomena. Governments, the media and business often bring up sub-issues such as reducing pollution and reducing the carbon footprint of economic and other activities that people carry out.

So, what do we mean by carbon footprint? While we originally used the term carbon footprint as defined by Warckernagel in 1996, we now use the term carbon footprint to define the amount of climate change-determining gas emissions associated with production and human consumption activities. In 2008, Wiedmann and Minx propose that the carbon footprint should measure direct and indirect CO₂ emissions, without including other greenhouse gases, in which case we would discuss the climate footprint. He also makes an inventory of calculation methodologies and brings to our attention that it is important to avoid double counting of carbon footprints along supply chains and life cycles (Wiedmann, 2008).

Another proposal on carbon footprint measurement comes from Wright et al. who propose taking into account CO₂ and CH₄ emissions, arguing that these are the main greenhouse gases and their impact is easy to identify, making such measurement practical and affordable for the organizations. He also states that the choice of calculation methodology depends on the specificity of the organization and also on the desired outcome, and that the calculation methods used should also reflect these aspects (Wright et al., 2011).

Pandey proposes to measure the carbon footprint by estimating the total amount of GHG from a product by considering the entire life cycle from the carbon footprint of the raw materials needed to manufacture to the actual production of that product. (Pandey and Agrawal, 2014)

Further to this idea, Kumar proposes to measure the carbon footprint in tones of CO₂ generated by human activities as the sum of two components: the primary component which measures emissions from public and private transport, air travel or burning of fossil fuels including domestic energy consumption and the secondary component which indirectly measures CO₂ emissions and shows that the more goods we buy, the more emissions will increase. (Kumar, 2014)

Carbon footprint research includes studies on the contribution that each of the world's economies makes to total carbon emissions as a total or per capita, but there are also specialized studies that specify the impact that particular human activities have on the carbon footprint. For example, Syafrudin et al. have studied the impact of academic activities on the carbon footprint. They concluded that electricity consumption and transportation to and from the University campus are the biggest CO₂ generators and propose as solutions energy conservation, the use of public transport and the expansion of green space in the area so that more of the greenhouse gases can be absorbed. (Syafrudin et al, 2020)

Other example is a study of the carbon footprint of an average family in Port Harcourt, one of Nigeria's main oil-producing towns. The data was collected from 261 households on their consumption habits, and it was found that small changes in daily routines can significantly reduce greenhouse gas emissions. (Gershon, 2019)

Another type of studies is those that identify whether the targets proposed by the ratification of international protocols have been achieved. Regarding this, Aichele and Felbermayr studied the global impact of the Kyoto Protocol and concluded that domestic emissions of the signatory countries were reduced by 7%, but at the same time the share of imported emissions increased by 14%, which translates into a lack of overall effects in terms of carbon emissions. (Aichele and Felbermayr, 2012)

Carbon emission levels can predict environmental risks and thus we can take the necessary measures for development in line with the environment and in order to increase the quality of life. Reducing the carbon footprint can be done by reducing the parameters directly responsible for

emissions, i.e., reducing population, energy production, income. The impact of carbon emissions needs to be studied from a dual perspective, as it generates environmental risks such as resource depletion or climate change and at the same time it produces negative social impacts limiting human rights and endangering human health and safety. (Wandana, 2021)

3. Research methodology

Methodologically, we wanted to achieve a balance between theory and practice, therefore we did empirical research to see what impact the world's major economies have on the total carbon emissions, if the economic growth of these countries is sustainable and what can be done to reduce the greenhouse gas emissions.

For this purpose, we have used longitudinal and cross-sectional methods. Longitudinal methods were used to highlight the indicator changes over time and whether the commitments they have made have had the expected effect. Cross-sectional methods were used to show the contribution of countries to the total carbon footprint. To complete our research, we used comparative methods to show the impact of greenhouse gas emissions on the environment.

4. Findings

Reducing greenhouse gas emissions is one of the main targets of sustainable development, and carbon footprint is an important climate change indicator used to measure environmental impacts. It is mainly measured using carbon emissions in MtCO₂ or carbon emissions per capita in order to identify the comparative contribution of the world's countries to total emissions, and the causes of these emissions.

Table no. 1 Country level CO₂ emissions from human activity (MtCO₂)

Country	2020	2019	2015	2009	1997	1992	1987	1972	Percentage change 2019 compare to 1972 (%)	Percentage change 2019 compare to 2009 (%)
China	10668	10490	9848	7887	3510	2731	2258	969	982.55	33.00
India	2442	2626	2269	1613	860	656	456	203	1193.59	62.80
Japan	1031	1106	1223	1163	1245	1179	903	852	29.81	-4.90
Russian Federation	1577	1679	1623	1529	1475	1958	2356	1605	4.61	9.81
Saudi Arabia	626	622	675	466	216	316	190	70	788.57	33.47
United States of America	4713	5256	5372	5478	5687	5168	4825	4573	14.93	-4.05
EU27	2599	2910	3089	3325	3655	3672	3830	3548	-17.98	-12.48
Total emissions for selected countries	25676	26708	26114	23470	18645	17672	16805	13792	93.64	13.79
World	34807	36703	35496	31607	24301	22570	26266	16221	126.27	16.12
Selected countries emission in total world (%)	73.77	72.77	73.57	74.26	76.73	78.30	79.02	85.03	-	-

Source: Global Carbon Atlas 2022, <http://www.globalcarbonatlas.org/en>, Accessed 07/27/2022

Table 1 shows the trends in total CO₂ emissions for the countries and economies considered to be the main polluters. The time points chosen correspond to the important dates when world leaders met and made commitments to reduce emissions. We also took into account the most recent data available, 2020, as well as the values recorded by the indicator in 2019, the year preceding the Covid-19 crisis.

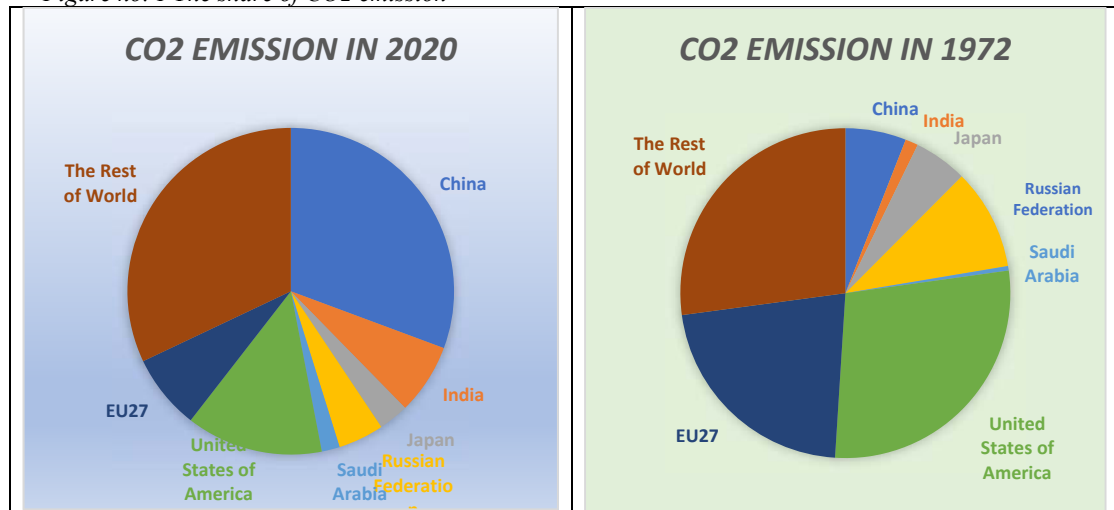
With the exception of China and Saudi Arabia, all the countries and economies in the study show considerable decreases of CO₂ emissions in 2020 compared to 2019. This is the consequence of the world economies slowing down due to the health crisis.

In 2019 compared to 1972, there were increases in gas emissions for all economies studied except the EU27. The largest increase is recorded for India of almost 12 times, followed by China with an increase of almost 10 times in CO₂ emissions for the period analysed. Considerable increases are also recorded for Saudi Arabia, and for the EU27 we note a 17% decrease in CO₂ emissions in 2019 compared to 1972.

Next, we have analysed how the indicator measuring CO₂ emissions in 2019 has evolved compared to 2009, after a decade, also taking into account that 2009 is the year immediately following the 2008 crisis and a reference point for international commitments on pollution reduction. We found that we have increases ranging from 9.81% for the Russian Federation, to 62.80% for India and 33% increases for China and Saudi Arabia. Gas emission decreases were recorded for Japan of 4.90%, the USA of 4.05% and the EU27 of 12.48%. Across all economies surveyed, CO₂ emissions were 13.79% higher in 2019 compared to 2020.

Also, the selected countries and economies recorded CO₂ emissions representing values of more than 70% of the world total for the reference times analysed, with slow decreases in these weights, with the mention that this does not mean less pollution but only a displacement of its production.

Figure no. 1 The share of CO₂ emission



Source: Own processing using Global Carbon Atlas 2022, <http://www.globalcarbonatlas.org/en>

In Figure 1 we have analysed the share of CO₂ emissions for the countries included in the studies in total global emissions. Thus in 2020 out of total global emissions of 34807MtCO₂, China's carbon footprint was 30.64% with 10668 MtCO₂ emitted. China is followed in the ranking by the USA with emissions of 4713 MtCO₂, representing 13.54%, India with emissions of 2442 MtCO₂ representing 7% and Russia with total emissions of 1577 MtCO₂ representing 4.5%. The top three countries in the ranking China, USA and India total more than half of the total global emissions.

At EU27 level, total emissions in 2020 were 2599 MtCO₂, a share of 7.46%, of which Germany made the largest contribution, emitting 644 MtCO₂, a quarter of total EU27 emissions or 1.85% of global emissions. Germany is followed by Italy with 304 MtCO₂ and Poland with 300 MtCO₂.

In comparison, in 2009 China had a CO₂ emissions level of 24.95% of the total, India had an emissions level of 5.29% of the total, the USA 17.33% and the EU27 10.51% of the total. So, the top three countries account for 47.57% of total global emissions in 2009 compared to 50% in 2019.

5. Conclusions

Three countries, China, India and the Russian Federation account for half of the world's carbon footprint, but Planet Earth is one no matter where we pollute. We are all affected by this phenomenon and contribute directly and indirectly to global warming.

Among greenhouse gas emissions, CO₂ emissions contribute substantially to climate change and activities such as transport, construction, energy production are major sources of CO₂ emissions. Measuring the carbon footprint can be done at an individual, product or country level, and the carbon footprint has become a target indicator for sustainable development.

Studies have shown that developing countries contribute to the rapid increase in emissions, while the concern for a sustainable development is a predominant focus in developed countries, obviously with some exceptions.

It is unfair and bankrupt to fight for decarbonisation only in one part of the world, for example in the EU, if the fight is totally disconnected from the USA or the first countries mentioned above. We all have the same responsibility towards the planet and we all want a greener planet, but the solution comes from limiting consumption, because excessive consumption of goods translates into pollution, no matter where on the planet it occurs.

In line with economic justice and sustainable development, we believe that economic bankruptcy is not the key to success. It is our duty to hand on to future generations a planet that is as green and has the same resources that we enjoy today, but the measures cannot be taken by one part of the world's governments alone.

Moreover, reducing pollution is part of our way of life, production and consumption and therefore each of us must promptly reconsider our role in reducing our carbon footprint in the spirit of achieving economic justice.

6. References

- Aichele, R.; Felbermayr, G., 2012. Kyoto and the carbon footprint of nations, *Journal of Environmental Economics and Management*, Volume 63, Issue 3, pp. 336-354;
- Durojaye, O., Laseinde, T., Oluwafemi, I., 2020. A Descriptive Review of Carbon Footprint. In: Ahram, T., Karwowski, W., Pickl, S., Taiar, R. (eds) *Human Systems Engineering and Design II. IHSED 2019. Advances in Intelligent Systems and Computing*, vol 1026. Springer, Cham;
- Gershon, O., 2019. Carbon (CO₂) Footprint Determination: An Empirical Study of Families in Port Harcourt, *IOP Conf. Series: Journal of Physics: Conf. Series* 1299;
- Kumar, M., Sharm, L., Vashista, P., 2014. Study on carbon footprint, *International Journal of Emerging Technology and Advanced Engineering*, Volume 4, Special Issue 1, pp. 345–355;
- Pandey, D., Agrawal, M., 2014. Carbon footprint estimation in the agriculture sector, *Assessment of Carbon Footprint in Different Industrial Sectors*, vol. 1, pp. 25–47;
- Syafrudin, S.; Zaman, B.; Budihardjo, M.A.; Yumaroh, S.; Gita, D.I.; Lantip, D.S., 2020. Carbon Footprint of Academic Activities: A Case Study in Diponegoro University, *IOP Conf. Series: Earth and Environmental Science* 448;
- Soroceanu, V., 2000. *Creșterea economică și mediul natural [Economic growth and the natural environment]*. Bucharest: Economic Publishing House;
- Wandana, L.S. et al, 2021. Carbon Footprint Analysis: Promoting Sustainable Development, *Journal of Research Technology and Engineering*, Vol 2, ISSUE 1, January 2021;
- Wiedmann, T. and Minx, J., 2008. *A Definition of 'Carbon Footprint'*. In: C. C. Pertsova, *Ecological Economics Research Trends: Chapter 1*, pp. 1-11, Nova Science Publishers, Hauppauge NY, USA. https://www.novapublishers.com/catalog/product_info.php?products_id=5999.
- Wright, L. A.; Kemp, S.; Williams, I., 2011. Carbon foot printing: towards a universally accepted definition, *Carbon Management*, Volume 2, Issue 1, pp. 61-72;
- * * * *Global Carbon Atlas 2022*, [online] Available at: <http://www.globalcarbonatlas.org/en>, Accessed 07/27/2022