European Economic Letters
ISSN 2323-5233
Vol 13, Issue 1 (2023)
https://doi.org/10.52783/eel.v13i1.171
http://eelet.org.uk

Strategies for Reducing Carbon Footprints: A Cross-Sectional Study of Experts' Opinion

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Abstract

Time and again, environmentalists have heralded cautious warnings about the ill-effects of a large carbon footprint. With the advancements in technology and infrastructure, we have become accustomed to this phrase. The carbon footprint (CFP) is a measure of the amount of greenhouse gases, particularly carbon dioxide, that are released into the atmosphere because of human activities, such as transportation, energy production, and manufacturing. It is a metric that quantifies the effect of human activities on the environment, specifically its contribution to climate change. The issue of carbon footprint is significant because the excessive emissions of greenhouse gases have been linked to global warming, climate change, and other environmental problems. These problems can have severe consequences on our planet, including rising sea levels, extreme weather conditions, and the loss of diversity in flora and fauna, which can affect human life, health, and livelihoods. Reducing our carbon footprint is acutely important to minimise the impacts of climate change This can be achieved by adopting sustainable methods such as using renewable energy sources, reducing despoil, and promoting eco-friendly transportation. Governments, businesses, and other people all have a role to play in reducing carbon emissions to protect the planet for future generations.

Keyword- Carbon Footprint, Global Warming, Energy Sources, Future Generation, Carbon Trading.

Introduction

Sea level rise, extreme weather, and the disappearance of biodiversity are just a few of the major issues that global warming and climate change, which are being exacerbated by rising CO_2 levels in the atmosphere, are causing. These emissions, released by an organisation or an individual, contribute significantly to the carbon footprint. Individuals, businesses, and governments must take ownership of their carbon footprints and work to reduce them. This can be accomplished via a variety of techniques, including the use of energy-conserving technologies, reduced energy consumption, and the adoption of sustainable practises (Martens et al., 2017). The authors also highlight “life cycle analysis” (LCA) as an essential tool to correctly evaluate energy production systems based on their environmental impact. LCA considers a variety of factors, including energy consumption, resource depletion, and greenhouse gas and other pollutant emissions. It aids in identifying areas where a product's or process's environmental impact can be reduced. Contrary to popular belief, even renewable sources of energy have certain CO_2 emissions during their construction, transport, or maintenance. However, these values (g CO_2 equivalent released per KWh) are substantially lower for renewable resources like wind turbines (7–56 g CO_2/KWh) than non-renewable ones like coal (740–910 g CO_2/KWh).

As far as the global carbon footprint is concerned, the United States accounted for nearly 14% of global carbon emissions in 2012, followed by China with 28% and the European Union with 10%. In Asia, India, Russia, and Japan contributed roughly 6%, 5%, and 4% of the world's carbon emissions, respectively. The study also discovered that the use of fossil fuels, such as oil, coal, and natural gas, was a significant contributor to these emissions (Kanemoto et al., 2016). Another study by Sarkodie (2021) found that, China was the largest contributor to carbon emissions in 2017, accounting for approximately 28% of total emissions. The United States came in second, accounting for 15% of global emissions, followed by India, which accounted for 7%. It is, however, important to note that industrialised countries such as the United States, the European Union, and Japan have historically contributed more to cumulative emissions,

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while emerging economies like China and India are now responsible for a significant portion of annual emissions. This can also be attributed to the disparity in the per capita emission between developed and developing nations wherein the former are responsible for much higher per capita emissions. Therefore, there is an immediate need to develop a robust plan for mitigating global carbon emissions. Not only that but plans also need to be brought to life by swift and effective actions. Marketing 3.0 is also about taking care of the triple bottom concept and contributing to a better earth (Srivastav & Mittal, 2021).

Literature Review

In developing countries such as India, one of the major sectors responsible for large amounts of carbon emissions is the agricultural industry. Approximately 40% of the global land is used for agrarian purposes. Therefore, one can only imagine the colossal amount of greenhouse gas emissions from this sector. Sah and Devakumar (2018) have written extensively about the carbon footprint of crop cultivation and other agricultural practices in India and suggested some ways to tackle this issue. Rice, one of the major staple diets in southern India, is a significant source of methane emissions, a potent greenhouse gas that has a major role in global warming. The total emission from all the major crops, i.e., rice, cereals, and pulses, has shown a progressive increase with time. Other agricultural practices, such as the use of chemical nitrogenous fertilizers, the burning of crop residues, inefficient irrigation practices, and the use of diesel-powered irrigation pumps, also contribute to India's carbon footprint. The solution lies in solar-energy powered irrigation, biological pest management, and biofertilizer systems, which can minimize unscrupulous use of pesticides and thoroughly reduce dependency on inorganic fertilizers, respectively.

According to Gan et al. (2011), another strategy is to implement conservation tillage practices. By reducing or eliminating tillage, farmers can reduce the amount of CO_2 released into the atmosphere from the soil. This can also improve soil health and water retention. This can be achieved in three ways – conventional, conservational, and organic. The former practices can lead to soil erosion and the loss of organic matter because of the use of inorganic fertilizers and pesticides. On the contrary, organic management includes natural or biological pest control and symbiotic legumes and fertilising manure for nutrient replenishment.

Alongside agriculture, there is another industry that sells what agriculture produces. The food industry accounts for exceptionally large amounts of food waste, transportation inefficiencies, and other unsustainable practices that lead to the generation of a more expansive footprint. According to Lal (2022), food waste accounts for approximately 30% of global food production and lowering it would have a significant impact on CFP reduction in agroecosystems. Implementing better inventory management practices, improving supply chain logistics, and educating consumers on the importance of reducing food waste are some of the ideas that can be implemented to competently reduce food wastage. Another key tactic for lowering the food industry's carbon footprint is to reduce transportation emissions. It can be accomplished by streamlining transportation routes, employing fuel-efficient automobiles, and integrating alternate modes of transportation, such as rail or waterways, into place. Finally, as previously said, agriculture and the food sector are inextricably linked. To lessen the environmental effect of the food sector, it is critical to develop sustainable agricultural techniques, reduce food waste, and encourage local and organic food production. Other sustainable agricultural methods, such as the use of feed additives that limit methane emissions from cattle, can reduce greenhouse gas emissions related with livestock production. These actions can make a huge difference in attaining a more viable future.

One can always pledge to bring about healthy changes in their lifestyle that are not only more informed but also environmentally sustainable. Dietary changes to ones that consume less meat and animal-based products can go a long way in ensuring sustainability. As González-García et al. (2018) explain, animal products require more assets, such as grazing field, water, and energy, to produce compared to plant-based foods. Due to enteric fermentation's lower level of methane emissions, substituting meat eaten by monogastric animals for that of ruminants greatly reduces the carbon footprint. Another point added by Scarborough, P. *et al.* (2014), mentions that gases such as methane, carbon dioxide, and nitrogen oxides are emitted during various stages of animal production, including fodder production, animal transportation, and manure management. Animal agriculture requires a significant amount of land, water, and energy. For example, producing one pound of beef requires 13 times more water than producing one pound of soybeans. Similarly, producing animal feed requires more land and energy than producing plant-based foods. By contrast, a vegan

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diet is relatively low impact in terms of GHG emissions, land use, and water use. Plant-based products require less land, water, and energy to produce than animal-based foods, which means that a vegan diet has a smaller carbon footprint and is more environmentally sustainable. Therefore, if not completely vegan, one should always incorporate more plant-based meals in their daily lives.

Not just from a carbon footprint generation point of view, plastics are a menace to the society because of their role in environmental pollution. The accumulation of plastic waste in oceans and landfills has resulted in the deaths of marine animals and birds, as well as the contamination of soil and water sources. It is crucial to find sustainable alternatives to plastic to reduce its impact on the environment. Zheng & Suh (2019) have suggested some strategies to reduce CFP related to plastics by reducing plastic production, improving plastic manufacturing processes, implementing effective waste management strategies, promoting consumer behaviour changes, and supporting policy and regulatory action. Apart from plastics, other major consumer goods that contribute to a huge CFP are food, housing, and transportation (Bocken & Allwood, 2012). The authors also suggest tactics to help improve current strategies to mitigate such emissions. In the food sector, strategies have already been discussed above. In housing, improving the energy efficiency of homes through measures such as insulation, efficient heating systems, and renewable energy sources can help reduce their CFP. Reducing the use of private cars and promoting public transportation, walking, and cycling helps in reducing the carbon footprint of transportation. In addition, the construction and cement industry ae also major contributors of global CFP. Onat & Kucukvar (2020) provide useful insights on how the implementation green building standards, such as “LEED or BREEAM”, can help ensure that construction projects are designed and built with sustainability in mind. They suggest that policymakers should incentivize the adoption of circular economy principles such as reusing, recycling, and repurposing of building materials that can help reduce the ecological impact of the construction industry.

Lastly, global tourism is an ever-increasing industry, and as is obvious, it also impacts global greenhouse gases and CO_2 emissions. To reduce CFP, sustainable tourism practices must be adopted, such as promoting low-carbon transport options, eco-friendly accommodations, and local businesses that employ sustainable practices. Technology can also help reduce carbon emissions in the tourism industry, such as smart energy systems, renewable energy sources, and energy-efficient buildings and transportation. Additionally, governments and tourism industry stakeholders can set carbon reduction targets, and tourists can play a role in reducing CFP by being more aware of their environmental impact and adopting sustainable travel practices. Regional tourism can also help reduce carbon emissions by promoting tourism to destinations closer to home. (Lenzen et al., 2018).

Objectives of the study:

To explore the strategies for reducing carbon footprints

Research Methodology:

This study is empirical in nature. In this study 220 respondents were contacted to give their viewpoints on finding the strategies for reducing carbon footprints. The data analysis was done with the help of the frequency distribution and pie charts were used to present the data.

Data Analysis and Interpretation:

Table 1 Use of solar powered irrigation and biological pest management

Particulars	Agree	Disagree	Can’t Say	Total
Respondents	184	25	11	220
% age	83.6	11.4	5.0	100

Table 1 presents that with the statement **use of solar powered irrigation and biological pest management**, it is found that 83.6% of the respondents agree with this statement.

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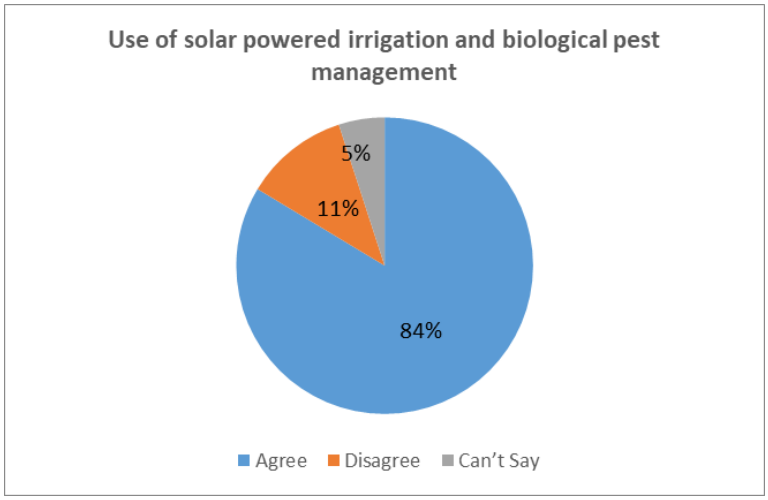

Figure 1 Use of solar powered irrigation and biological pest management

Table 2 By reducing or eliminating tillage, farmers can reduce the amount of CO2

Particulars	Agree	Disagree	Can't Say	Total
Respondents	177	29	14	220
% age	80.5	13.2	6.4	100

Table 2 presents that with the statement **by reducing or eliminating tillage, farmers can reduce the amount of CO2,** it is found that 80.5% of the respondents agree with this statement.

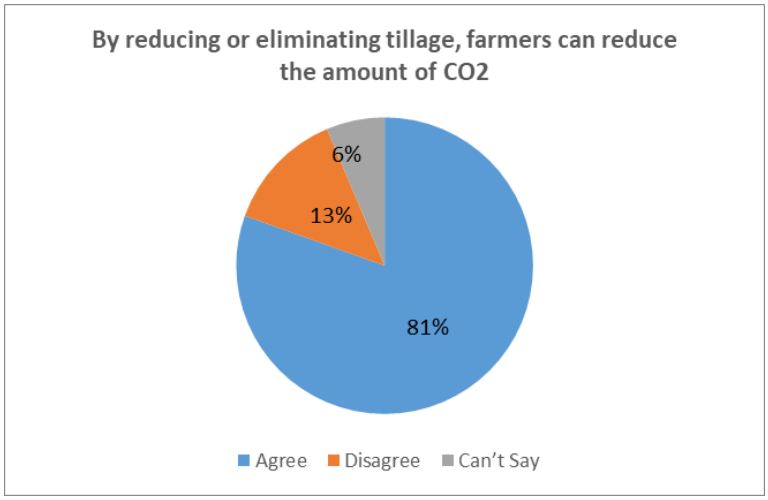

Figure 2 By reducing or eliminating tillage, farmers can reduce the amount of CO2

Table 3 Reducing transportation emission by streamlining it routes

Particulars	Agree	Disagree	Can't Say	Total
Respondents	189	21	10	220
% age	85.9	9.5	4.5	100

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Table 3 presents that with the statement **reducing transportation emission by streamlining it routes,** it is found that 85.9% of the respondents agree with this statement.

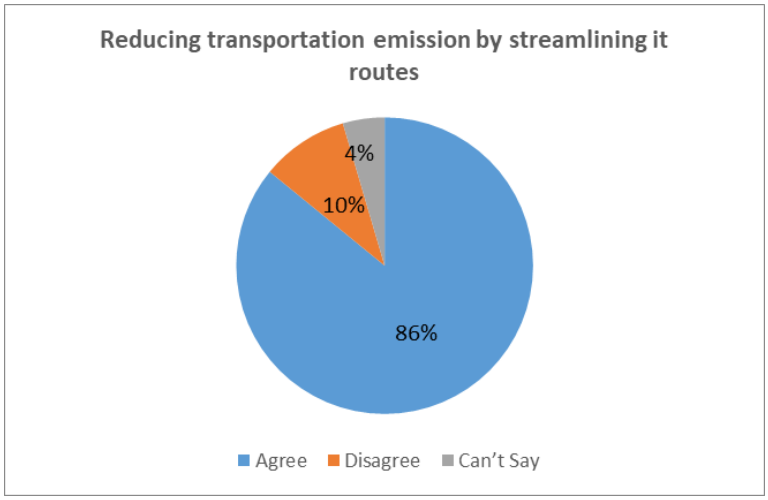

Figure 3 Reducing transportation emission by streamlining it routes

Table 4 Use of feed additives that limit methane emissions from cattle

Particulars	Agree	Disagree	Can't Say	Total
Respondents	172	35	13	220
% age	78.2	15.9	5.9	100

Table 4 presents that with the statement **use of feed additives that limit methane emissions from cattle,** it is found that 78.2% of the respondents agree with this statement.

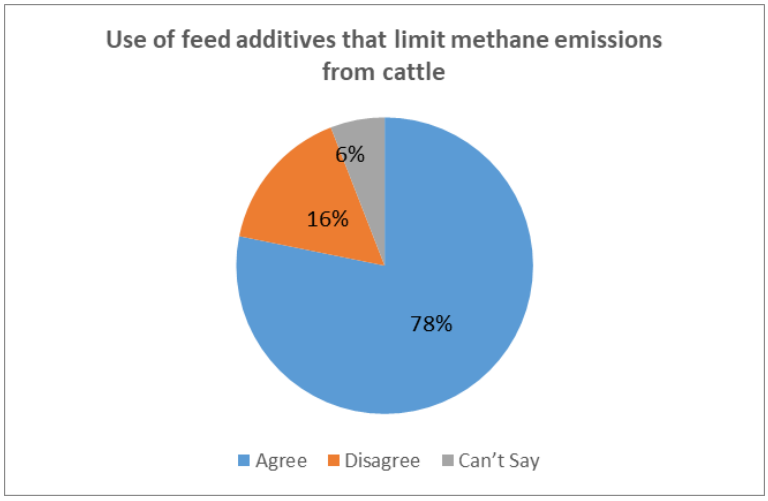

Figure 4 Use of feed additives that limit methane emissions from cattle

Table 5 Reducing plastic production and improving plastic manufacturing

Particulars	Agree	Disagree	Can't Say	Total
Respondents	192	20	8	220

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% age	87.3	9.1	3.6	100

Table 5 presents that with the statement **Reducing plastic production and improving plastic manufacturing,** it is found that 87.3% of the respondents agree with this statement. Considering all the responses of the statements, it was found that to a good percentage, the respondents have agreed which means the following strategies help in reducing carbon footprints.

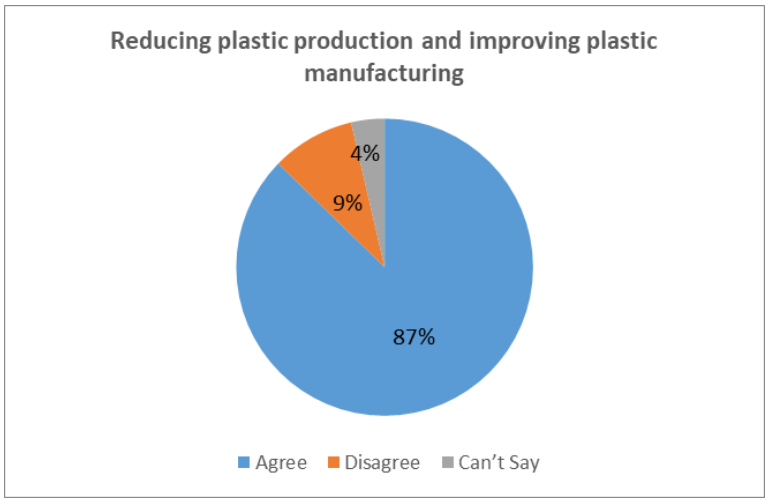

Figure 5 Reducing plastic production and improving plastic manufacturing

Conclusion

From agriculture and food to global tourism, CFP is an amalgamation of the total activities of an organisation or an individual that contribute to greenhouse gases and CO_2 emissions. Reducing CFP is important for tackling bigger issues such as climate change and global warming. As discussed at length, the reduction of CFP can be achieved by implementing sustainable practices such as using renewable energy sources, reducing waste generation, and adopting environmentally friendly transportation methods. These practices not only help in reducing CFP but also contribute to the overall well-being of the planet and its inhabitants. It is in the hands of informed and proactive individuals to take decisions in favour of the environment. Without necessary rules and regulations, policies cannot be implemented at large. Thus, both the general citizens of a country and the government bodies need to formulate and implement effective strategies for curbing the global carbon footprint. It is crucial to have a collective effort towards reducing our carbon footprint, as it is a global issue that affects everyone.

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