Thank you for the opportunity to read and review the paper.

The foundation laid out is promising but requires major enhancements to add real value to theory and practice.

I hope my comments can help in the development of your research paper.

Authors should consider the following major revisions to the paper:

LITERATURE REVIEW

- The literature review is entirely missing. There is maybe a specific reason, but the current version of the paper has no section reviewing any kind of academic literature. It means, consequently, that there is no definition of the terms, there is no justification of the literature gap, there is no evidence explaining how strong the research question is. In the literature review, authors should highlight arguments making the positioning of this research very clear.
- In the current version, we have the feeling that the literature has not been entirely scrutinized. The very large field of CSR and climate change is not researched at all, although it includes a lot of substantial arguments to elaborate the research questions.
- As a matter of examples, we provide three reasons why a literature review is needed (that list is not comprehensive) 1/ a literature review helps to define terms. Here, there is no definition of "GHG emissions", "net zero", "net 108 zero", "climate positive", "*reduction* in GHG emissions" etc… All these terms must be seriously defined. 2/ it clarifies the literature gap. Here, the first research question mentions "international standards", which requires a section about these standards in the literature review. This suggests the some companies are following international standards, others not. 3/ it brings constructs to the research.
- Research questions mention "GHG emissions reduction", which calls for a good understanding of what is driving GHG emissions (before discussing how to reduce the emissions). Thus, the literature review should report on drivers, processes, methods to measure GHG emissions across the different scopes 1/2/3, and provide constructs facilitating the comparison practice v/s theory (because you cannot assess firms' maturity in GHG emission without discussing the current knowledge about that particular field). These are only examples, justifying the need of adding a strong literature review section to that paper. This is indeed the biggest weakness of that paper.

METHODOLOGY

- Research strategy is not clear and the methodology section does not contain the basic/necessary elements describing the research approach. The three common approaches to conducting research are quantitative, qualitative, and mixed methods. The researcher anticipates the type of data needed to respond to the research question (Williams, 2007).
- Methodology requires major revisions, especially because the data collected come strictly from a collection of secondary sources. This is too weak to justify an adequate research validity. Indeed, concluding a research paper only based on firms' legal declarations is not a robust approach, especially to explore firms' actions on climate change. More precisely, considering annual reports can be a good way to better understand the context (in one word, it is necessary), but it is not sufficient because the nature of the annual reports makes them look like a marketing tool rather than a fair source of informations. "Green washing" positions are spread extensively within annual reports (Netto et al, 2020). Quality of data, especially data coming from people working in these companies, could strengthen the results. For instance, interviews of key people in these firms could benefit to a better understanding of the real actions taken and add granularity in the way these actions relate to

annual reports. That could complement the first stage of that research, based only on secondary data.

- The analysis: it focuses only on the description of annual reports. It is therefore based on a simple description and not an analytical approach. The deepness of the analysis has to be strengthen, which would be feasible if more data were collected.
- The case: the introduction contains interesting references suggesting that the pharmaceutical sector is an exemplar case to study, but adding a section about that topic in the methodology section could add more evidences justifying why this sector is adequate to that research.
- Scope of the research / unit of analysis. The perimeter of the research is very broad, as it includes "scope 1, scope 2 and scope 3" emissions. By involving scope 3, research should incorporate also the entire supply chain, at least the upstream supply chain, and collect data from the suppliers themselves.
- Data analysis. Several sentences are not clear, or mention concepts which are not exposed in the paper. For instance "Reported scope 1, 2, and 3 GHG emission values for the companies were documented and converted to the same units (metric tonnes carbon dioxide equivalents - MtCO2e) to ensure conformity." Which conformity is this about ? What kind of data are reported ? Where ? How ?

RESULTS/FINDINGS

- Results are questionable, for the reasons mentioned above (nature of the data collected).
- Research based only on secondary data does not allow to conclude "the vast majority have active commitments to reducing their GHG emissions". This conclusion is only based on advertised position of each of these firms.
- Same for the following suggestion: "Third-party assurance is also important to give credibility to company's reporting data, and it was encouraging to note that all companies 302 reported that their data had undergone auditing".
- One of the interesting finding in this research is the following: "We found that the total reported emissions intensity of the 20 pharmaceutical companies in this study was 151MT CO2e/$M of revenue". But it is like comparing apples and carrots! You cannot sum up all these numbers to get only one single result. What are the calculation algorithms behind each number collected from each company? Example: in the GHG protocol, spend data are mentionned in monetary or quantity-based values, and are combined with globally established databases to calculate the CO2 emissions for the scope 3. The input of spend is therefore necessary to bridge with CO2e/$M, but we haven't seen these figures in the paper. Nowadays, the emissions data usually come from a combination of licensed and open data sources including EcoInvent and Exiobase. Ecoinvent data is used for quantity-based values and Exiobase for monetary values. Have you collected the Exiobase numbers, to ba able to make your conclusions ? Also, CO2 analytics should take inflation and currency rates into account to match with the databases to increase accuracy. This has not been done here.
- Last, in addition to secondary data, CO2 analytics should provide supplier-specific informations directly from suppliers. As the unit of analysis is unclear (supposedly pharma companies or the entire sector, or only one firm), this missing information reduces the power of the conclusions.
- Last, the secondary data provided for all CO2 emissions (Exiobase, etc…) are also based on assumptions and averages for a specific purchase category and supplier location. You would perfectly understand that data provided by annual reports are not valid, because all the firms considered could change their supply base from one day to another, making the calculation obsolete. You should take this into account and therefore pay closer attention to the accu-

racy of the underlying calculations to limit further bias. Purchasing categories and emission categories are linked together, so there is a chance the best match is not achieved! Another limitation is the challenge of receiving perfect unit of measurement conversions, in which case the database Exiobase is prioritized. Finally, the accuracy of the calculations may differ depending on the underlying spend data, which is company-specific.

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