

Response to Reviewer 2 Comments

Manuscript ID: sustainability-1706605,

Title: Research on structure of carbon emission efficiency and influencing factors in Yangtze River Delta urban agglomeration

We appreciate the valuable comments from the reviewers and the editor. We read through and discussed the comments one by one, then we revised the manuscript according to these constructive suggestions. We think they have helped us to greatly improve this version. All places with modifications are marked in the revised text and a clear version with all changes accepted is attached as well. Detailed information on modifications is given below.

Point 1: In my opinion, you have to rewrite the keywords to remove the compound ones and reduce them, an entire phrase cannot be a keyword.

Response 1: Thank you for your comments. We originally intended to show as much of the rich perspectives of the article as possible through keywords. We reviewed the previous keywords and found that there was indeed an inappropriate choice of it. We have reconsidered the number, length and accuracy of the keywords and revised them as follows. Please refer to page 1 line 26-27 for details.

Point 2: The abstract is too long, it is 308 words, it must be reduced, it is not necessary to show all the conclusions in the abstract, showing the main conclusion in the abstract is enough.

Response 2: Many thanks for this comment. We would have liked the reviewers and readers to become more aware of the background, relevance and application of this research. However, we did find some statements in our review that were not necessary. We have reduced the introduction to the background, the section on the significance of the study at the end, and abbreviated some of the statements in the conclusion. Please refer to page 1 line 9-25 for details.

Point 3: In the introduction, it is necessary to identify the main objective of the work, which is presumed to be to analyze CO₂ emissions in the Yangtze River, as well as some secondary objective derived from it.

Response 3: Thanks for the reminder. In our review, we found that we had indeed overlooked this point. Again, we apologise for the lack of clarity and irregularity in our academic expression. Combining your review comments and the main intention of the article, we added a fifth paragraph to the introduction of the revised draft, pointing out our main content and objectives of the study. The primary objective of this study is to measure the efficiency of carbon emissions. In addition, we explore the spatial correlation structure of carbon emissions efficiency and the factors

influencing the spatial correlation structure using social network analysis and other econometric methods. Therefore, the objective of this paper is not merely to measure carbon emissions in the study area, but to explore in depth the pattern and mechanism of spatial correlation of carbon emissions, as well as the resulting practical applications. Please refer to page 1 line 72-80 for details.

Point 4: The research hypotheses have to be considered as such, h1, h2....., the work is quite interesting, but without this the approach remains in the air.

Response 4: Thanks for the suggestions and we have fully considered your suggestions. We have considered the fact that not all studies require hypotheses; usually descriptive and exploratory studies do not require hypotheses. But certain quantitative empirical studies, such as regression analysis, require hypothesis conditions. In response to point 3, we have added a fifth sub-section to the introduction, which clarifies the research questions and objectives. The research logic of this paper is based on an exploratory study without a parametric testing process. So in general, we use this way of raising questions-focusing on questions, instead of writing by hypothesis. However, in section 5.4 of the paper, we provide an exhaustive account of the process of establishing the research hypotheses and performing residual tests when QAP regression is used to detect the influencing factors. Please refer to page 1 line 50-81 for details.

Point 5: Figure 1 does not include the source (in this case own elaboration), and it is not a figure, it is a graph.

Response 5: Thanks for the emphasizing. We have reviewed all the figure and table notes in the article. We apologize for not being able to distinguish between figure and graph. So we immediately corrected all the graph notes, which were previously figure notes. We ensure that all graphs and tables are independently produced based on the existing administrative divisions and data generated.

Point 6: Nor do they put the source in figure 2 (it is understood that it is their own elaboration).

Response 6: Thank you for the reminder. All figures and tables are our original work. All data on which the figures, graphs and tables were produced, including geospatial data and statistical data, were based on the data sources presented in section 4.5. We plotted figure2 (now figure1 in the article) according to the Chinese Ministry of Natural Resources standard map (GS(2019)1825), as can be seen in section 4.5.

Point 7: In all the tables it is necessary to put the source.

Response 7: Thank you very much. We have explained in detail for each table how the data has been derived from the raw data, either above or below the table, including listing the formulae and clarifying the analytical ideas. The data sources are detailed in section 4.5. And we put the source for all the tables.

Point 8: In the discussion of results, it is missing to compare the results with those of some study mentioned in the bibliography.

Response 8: Thank you for your comments. As can be seen from the end of the literature review section, we did not initially give much consideration to comparing the results of the study with other studies, since both the perspective and the scope of the study are somewhat different from those of other studies. However, in the process of reviewing the bibliography again, we revisited the similarities and differences in the research ideas and findings. The results in some of the articles were found to be comparable to the results in this paper. We have therefore chosen a selection of the literature and made appropriate comparisons in the conclusion section of the article. We have not carried out too much comparison and discussion, and the results referenced in other literature are only of some reference value due to differences in study area and methodology. Compared with existing studies on regional carbon emission efficiency, this paper expands the research perspective and methodology, and provides spatial insights into the solution of regional carbon efficiency problems. Please refer to page 1 line 698-706 for details.

Point 9: Otherwise the work is quite good, so congratulate the authors for its originality.

Response 9: Thank you very much.

Point 10: Finally, it would be convenient to add more international jcr bibliography, practically all the bibliography is Asian.

Response 10: Thank you for the suggestion. We have taken your suggestion fully into account and have reviewed the literature review section of the article. It turned out that we have indeed mostly cited articles done by Asian authors. In order to reflect the completeness and scientific quality of the introduction and literature review, we have modified its contents, removed less important literature, added literature from European and American authors, including recent years and some classics, and ensured that the bibliography is authoritative. The following are the new additions.

Line 46: [5] Richard S.J. Tol. Carbon dioxide emission scenarios for the USA[J]. Energy Policy, 2006, 35(11) : 5310-5326.

Line 46: [6] Obas J E, Anthony J I. Decomposition analysis of CO2 emission intensity between oil-producing and non-oil-producing sub-Saharan African countries. Energy Policy, 2006, 34(18):3599-3611.

Line 46:[7] Johan Albrecht, Delphine Francois, Koen Schoors. A shapley decomposition of carbon emissions without residu-als. Energy Policy, 2002, 30:727-736.

Line 46:[8] Smruti Ranjan Behera, Devi Prasad Dash. The Effect of Urbanization, Energy Consumption, and Foreign Direct Investment on the Carbon Dioxide Emission in the SSEA (South and Southeast Asian) Region[J]. Renewable and Sustainable Energy Reviews, 2017(70): 96 - 106.

Line 46: [9] Afton Clarke-Sather, Jiansheng Qu,Qin Wang. Carbon inequality at the sub-national

- scale: A case study of provincial-level inequality in CO₂ emissions in China 1997–2007[J]. *Energy Policy*, 2011, 9(39): 5420-5428.
- Line 77-78: [14] Yamaji K, Matsushashi R, Nagata Y, et al. A study on economic measures for CO₂ reduction in Japan. *Energy Policy*, 1993, 21(2): 123-132.
- Line 98-99: [20] Dwyer L, Forsyth P, Spurr R, et al. estimating the carbon footprint of Australian tourism[J]. *Journal of sustainable tourism*, 2010, 18(3): 355-376.
- Line 99-101: [21] Hampf B, Rødseth K L. Carbon dioxide emission standards for U.S. power plants: An efficiency analysis per-spective [J]. *Energy Economics*, 2015, 50: 140-153.
- Line 101-103: [22] Hampf B, Rødseth K L. Carbon dioxide emission standards for U.S. power plants: An efficiency analysis per-spective [J]. *Energy Economics*, 2015, 50: 140-153.
- Line 106-108: [23] Zhang Z Q.; Zhang T.; Feng D F. Regional differences, dynamic evolution and convergence of carbon emission intensity in China[J]. *Research in Quantitative Economics and Technology*, 2022, 39(04): 67-87.
- Line 150-152: [33] Zhou P, Ang B W, Poh K L. Slacks-based efficiency measures for modeling environmental performance[J]. *Eco-logical Economics*, 2010, 60(1): 111-118.