

Peer Review

# Review of: "Integrating Quantum Computing with AI: A Perspective on Time-Series Forecasting"

Mario Coccia<sup>1</sup>

1. Italian National Research Council, Rome, Italy

Integrating Quantum Computing with AI: A Perspective on Time-Series Forecasting

The topics of this paper are interesting. The structure and content can be revised, and the results have to be better explained by the authors.

The abstract has to clarify the goal, methods of inquiry, and implications for the management of technology in these topics.

The introduction is short. It has to better clarify the research questions of this study, indicating the gap present in the literature that this study endeavors to cover, and provide more theoretical background. Explain the evolution of quantum technology with AI from a perspective of problem-driven innovation. After that, the authors can focus on the topics of this study to provide a correct analysis for fruitful discussion. (See suggested readings that must all be read and used in the text).

Sections 1 and 2 can be merged.

The methods of this study are not clear.

Authors have to clarify if this study is:

--A narrative review that explains the existing knowledge on a topic based on all the published research available on the topic.

--A systematic review that searches for the answer to a particular question in the existing scientific literature on a topic.

--A meta-analysis that compares and combines the findings of previously published studies, usually to assess the effectiveness of an intervention or mode of treatment.

The logic of the methods can be represented with a flow chart.

Results.

Some figures can clarify the results. Sections 4 and 5 can be merged.

Authors have to avoid subheadings that create fragmentation and confusion. If necessary, they can use bullet points (same comments for all sections).

Discussion.

First, authors have to synthesize the main results in a simple table to be clear for readers and then show what this study adds compared to other studies.

Although the Results section provides a description, there needs to be a more critical synthesis and comparison of the findings with the literature. The discussion section has to interpret and describe the significance of your findings in relation to what was already known about the research problem being investigated and explain any new understanding or insights that emerged from your research.

Comment on whether the results were expected for each set of findings; go into greater depth to explain unexpected findings.

Moreover, either compare your results with the findings from other studies or use the studies to support your results. This can include revisiting key sources already cited in your literature review section.

Describe lessons learned, proposing recommendations that can help improve technological development, highlighting best practices of innovation management in quantum technologies integrated with AI.

The conclusion is so short that it is useless. The conclusion has not to be a summary, but authors have to focus on the manifold limitations of this study and the risks of AI driven by quantum technologies. The conclusion does not adequately discuss the theoretical and managerial implications of the study. Summarize your thoughts and convey the larger significance of your research. Discuss how a gap in the literature has been addressed and demonstrate the importance of your ideas.

Make sure you create 3 subsections in the conclusion: 1) Theoretical Implications, 2) Managerial or Policy Implications, and 3) Ideas for Future Research.

Overall, then, the paper is interesting, but the content and structure are poor. The theoretical framework

is weak, and some results create confusion... the structure of the paper has to be improved; the study design, discussion, and presentation of results have to be clarified using the suggested comments.

Suggested readings.

Natarajan, G., Anna Bai, S.C.P., Soman, S., Elango, E. 2025. Quantum Computers-Real-World Applications and Challenges. *Quantum Computing and Artificial Intelligence: The Industry Use Cases*, pp. 49–75 2025

Coccia M. 2017. Sources of technological innovation: Radical and incremental innovation problem-driven to support competitive advantage of firms. *Technology Analysis & Strategic Management*, vol. 29, n. 9, pp. 1048-1061, <https://doi.org/10.1080/09537325.2016.1268682>

Boretti, A. 2024. Technical, economic, and societal risks in the progress of artificial intelligence driven quantum technologies. *Discover Artificial Intelligence*, 4(1), 67

Coccia M. 2017. Sources of disruptive technologies for industrial change. *L'industria – rivista di economia e politica industriale*, vol. 38, n. 1, pp. 97-120, ISSN: 0019-7416, DOI: 10.1430/87140

Habibi, M.R., Golestan, S., Wu, Y., Guerrero, J.M., Vasquez, J.C. 2025. Electrical load forecasting in power systems based on quantum computing using time series-based quantum artificial intelligence. *Scientific Reports*, 15(1), 7429.

Coccia M., Roshani S. 2024. Path-Breaking Directions in Quantum Computing Technology: A Patent Analysis with Multiple Techniques. *Journal of the Knowledge Economy*, J Knowl Econ (2024). <https://doi.org/10.1007/s13132-024-01977-y>

Bischof, L., Teodoropol, S., Fuchsli, R.M., Stockinger, K. 2025. Hybrid quantum neural networks show strongly reduced need for free parameters in entity matching. *Scientific Reports*, 15(1), 4318

Coccia, Mario. 2024. "Converging Artificial Intelligence and Quantum Technologies: Accelerated Growth Effects in Technological Evolution", *Technologies* 12, no. 5: 66. <https://doi.org/10.3390/technologies12050066>

Moon, K.-H., Jeong, S.-G., Hwang, W.-J. 2025. QSegRNN: quantum segment recurrent neural network for time series forecasting. *EPJ Quantum Technology*, 12(1), 32

M. Coccia and S. Roshani, "Evolutionary Phases in Emerging Quantum Technologies: General Theoretical and Managerial Implications for Driving Technological Evolution," in *IEEE Transactions on Engineering Management*, vol. 71, pp. 8323–8338, 2024, doi: 10.1109/TEM.2024.3385116.

- Majid, B., Sofi, S.A., Jabeen, Z. 2025. Quantum machine learning: a systematic categorization based on learning paradigms, NISQ suitability, and fault tolerance. *Quantum Machine Intelligence*, 7(1), 39
- Coccia M., Mosleh M., Roshani S., 2024. Evolution of Quantum Computing: Theoretical and Innovation Management Implications for Emerging Quantum Industry. *IEEE Transactions on Engineering Management*, vol. 71, pp. 2270-2280, DOI (identifier) 10.1109/TEM.2022.3175633
- Akpan, I.J., Kobara, Y.M., Owolabi, J., Akpan, A.A., Offodile, O.F. 2025. Conversational and generative artificial intelligence and human–chatbot interaction in education and research. *International Transactions in Operational Research*, 32(3), pp. 1251–1281
- Coccia M. 2024. “Technological trajectories in quantum computing to design a quantum ecosystem for industrial change.” *Technology Analysis & Strategic Management* 36 (8): 1733–1748. <http://dx.doi.org/10.1080/09537325.2022.2110056>
- Palaniappan, V., Ishak, I., Ibrahim, H., Sidi, F., Zukarnain, Z.A. 2024. A Review on High-Frequency Trading Forecasting Methods: Opportunity and Challenges for Quantum Based Method. *IEEE Access*, 12, pp. 167471–167488
- Coccia M. 2022. Disruptive innovations in quantum technologies for social change. *Journal of Economics Bibliography - J. Econ. Bib. - JEB*, vol. 9, n.1, pp. 21-39. DOI: <http://dx.doi.org/10.1453/jeb.v9i1.2287>
- Gohel, P., Joshi, M. 2024. Quantum Time Series Forecasting. *Proceedings of SPIE - The International Society for Optical Engineering*, 13072, 130721B

## Declarations

**Potential competing interests:** No potential competing interests to declare.