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EDITORIAL SCOPE: GEOTECHNICAL EARTHQUAKE ENGINEERING EDITION

Imtiyaz Akbar Najar and Raudhah Ahmadi *

Department of Civil Engineering, Faculty of Engineering, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

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*Corresponding author's email: araudhah@unimas.my
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Abstract — One of the main civil engineering disciplines is currently the focus area of the Journal of Civil Engineering, Science, and Technology (JCEST): geotechnical and earthquake engineering. We are honoured to present this editorial focusing on the dynamic and evolving field of geotechnical earthquake engineering, with an emphasis on seismic soil-structure interaction (SSI). These studies offer valuable insights into novel design methodologies, materials, and analysis approaches, which are crucial for ensuring the safety and resilience of infrastructure. This editorial paper collected information from the freely-accessible SCOPUS database to identify common keywords used in published papers pertaining to geotechnical earthquake engineering from 2015 to 2023. The analysis reveals that the 'seismic' and 'structure' terms are the most frequently utilised keyword in articles related to this field. As the editors of our esteemed journal, it is our privilege to shed light on this critical area of research that plays a pivotal role in ensuring the safety and resilience of civil infrastructure subjected to seismic forces.

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***Keywords*:** geotechnical earthquake engineering, soil-structure interaction, civil engineering, JCEST, Scopus

1.0 INTRODUCTION

Geotechnical earthquake engineering, the intersection of geotechnical and earthquake engineering, has perceived incredible growth and importance over the years. Its significance has been powered by the increasing challenges posed by urbanisation and the need to design and construct structures that can withstand and respond optimally to seismic events. One of the most significant aspects of geotechnical earthquake engineering is seismic soil-structure interaction, a complex phenomenon that encompasses the dynamic interaction between the soil foundation and the superstructure during seismic motions [1–3]. SSI's influence on the structural response is undeniable, and accurate modeling of this interaction is crucial to designing safer and more efficient structures in seismic regions [1, 4]. Seismic occurrences, or earthquakes, can have serious consequences for SSI. When seismic waves flow through the soil, they can change the qualities of the soil, such as stiffness and damping, which affects the behaviour of structures [5–7]. The mismatch between the soil and the structure's seismic responses can result in increased stresses, deformations, and potential damage to structures and infrastructure [8]. In extreme circumstances, failing to account for SSI effects can lead to structural failures and collapse during seismic occurrences. Understanding and appropriately accounting for SSI is critical in earthquake design and engineering to assure building safety and resilience while mitigating unfavourable effects [4].

Researchers, academics, and practitioners have attempted to develop sophisticated analytical and numerical models that reflect the complex dynamics of SSI. The recent advancements in computational methods, such as finite element analysis and boundary element methods, have enabled more accurate and realistic simulations of soil-structure behaviour under seismic loading [4–7]. Additionally, the utilisation of advanced geotechnical testing techniques has provided valuable data to validate and improve these models, leading to enhanced design procedures and innovative seismic mitigation strategies. Furthermore, the integration of cutting-edge technologies, such as artificial intelligence and machine learning, has opened new avenues for understanding and predicting the behaviour of geotechnical systems during earthquakes. These emerging technologies have shown great potential in optimising designs, predicting ground motions, and assessing the vulnerability of critical infrastructure.

As an academic community, it is imperative that we continue to foster research collaboration and knowledge exchange to address the ongoing challenges and explore untapped opportunities in geotechnical earthquake engineering, especially regarding seismic soil-structure interaction. Our journal aims to serve as a platform for disseminating groundbreaking research, in-depth case studies, and review articles that delve into this intricate domain. In conclusion, we encourage all scholars, practitioners, and stakeholders involved in geotechnical earthquake engineering to contribute to our journal with their insightful research findings and expertise. Together, we can advance our understanding, innovate new solutions, and contribute to the sustainable development of earthquake-resilient infrastructure.

2.0 INSIGHTS FROM GLOBAL PUBLICATION TRENDS: A COMPREHENSIVE ANALYSIS

On a global basis, this thorough analysis investigates the changing trends in research publications connected to earthquakes and soil-structure interaction. Earthquakes are unpredictable and unavoidable, and they have significantly impacted human life, infrastructure, and economic development. The negative impacts have raised concerns among researchers throughout the world regarding the robustness of structures and their components that are exposed to seismic hazards [9, 10]. As a result, various approaches for mitigating the adverse effects have been developed through the consideration of SSI [11–13]. SSI refers to the dynamic interaction between the soil and the structure built on it. This interaction can significantly impact the behaviour and stability of the structure, particularly in cases where the soil experiences significant changes in load, moisture, and temperature. It is critical to consider SSI in the design of structures such as buildings, bridges, and foundations, as it can significantly impact the overall performance of these structures [14–19]. It is an essential consideration in the design of foundations, retaining walls, and other structures that are in contact with the soil. The analysis of SSI can be done using analytical, numerical, or experimental methods [12, 20–22]. Figure 1 (a) presents a comprehensive overview of published documents from the SCOPUS database, resulting from a keyword search combining “seismic”, "soil," "structure," and "interaction" from 2015 to the year 2023. From the past decade, the number of relevant documents consistently hovers around 3,571 or more, indicating a sustained interest in this field [23]. From 1970 to 2023, 7500 and more documents are available in SCOPUS database depicted in Figure 1 (b).

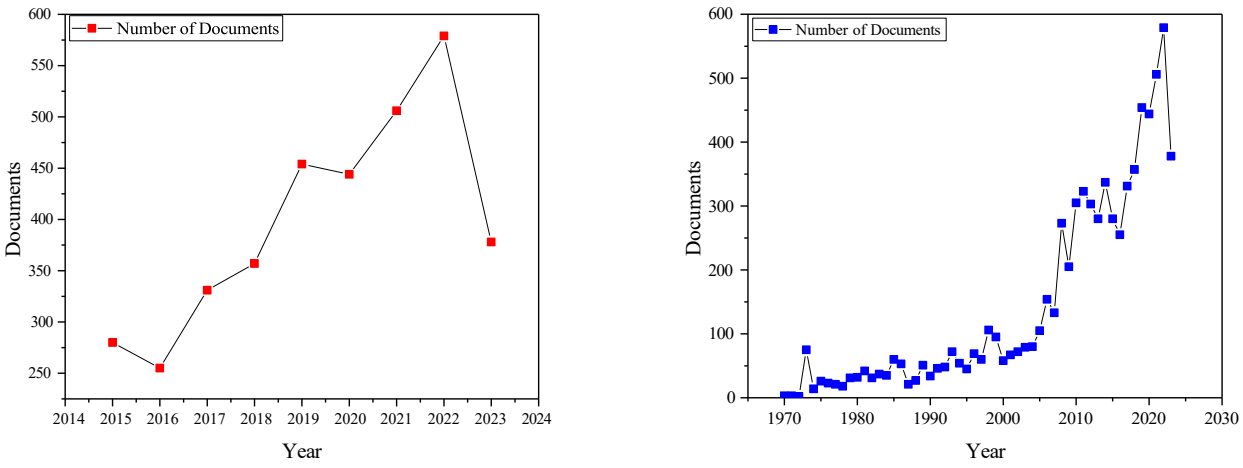


Figure 1 Number of SCOPUS published documents by year: (a) from 2015 to 2023 (b) overall (keyword: “soil” AND “structure” AND “interaction” AND “seismic”)

3.0 JCEST PUBLICATION TRENDS

The number of downloads constantly outweighs the number of readings and citations for a research publication. Researchers devote an immense amount of time searching for articles using keywords, as these terms steer search engines to the needed material. Precision in keyword selection can increase an article's visibility and lead to an increase in citations. The important keywords in the domain of geotechnical earthquake engineering, as determined by the publishing trend in JCEST, have been retrieved in this editorial note. Articles were extracted from JCEST on the basis of the keywords like “seismic”, “structure”, and “soil”, which is shown in the Figure 2. There are fewer papers published in JCEST in the discipline of geotechnical earthquake engineering than in other fields of civil engineering such as waste management, structure, and materials. No in-depth research or simulation has been done because the goal of this editorial is to briefly highlight the important contributing keywords and domains as seen from the publishing trend in JCEST. The figures instead are those that can be easily estimated using the open-source journal system. With this clarity, these numbers offer a preliminary understanding and a better look at the popular themes and subjects in various branches of civil engineering that are related to geotechnical earthquake engineering.

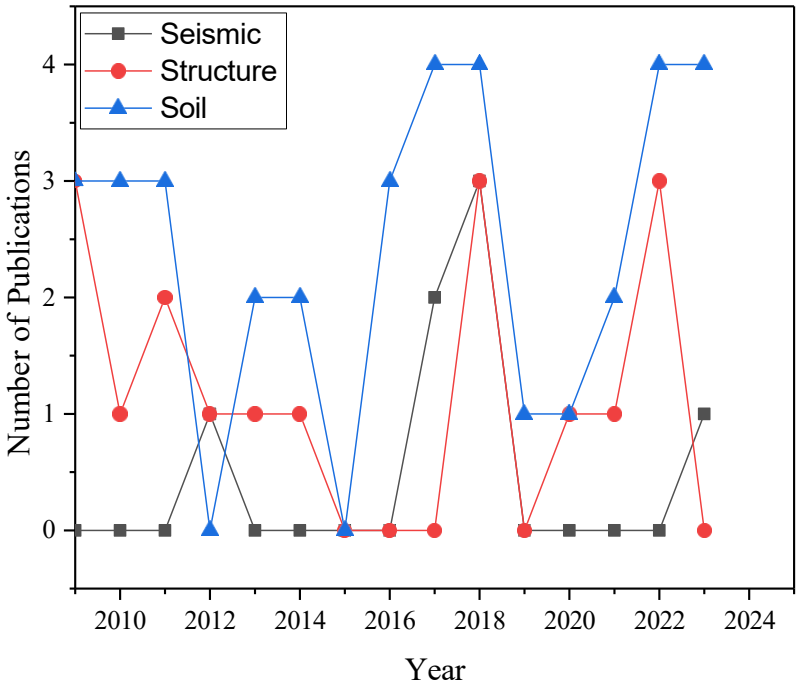


Figure 2 JCEST articles based on the keywords seismic AND structure AND soil

The distribution of sectors related to geotechnical earthquake engineering demonstrates that the engineering sector is the most prominent, accounting for over half of the total contribution part, as shown in Figure 3. Individuals from the earth and planetary sciences, agricultural and biological sciences, environmental sciences, materials science, and social sciences in that order, are the next major contributors. The remaining contributions are a mash-up of various less important domains. Notably, the most prominent keywords for the research community focused on geotechnical earthquake engineering and soil-structure interaction are civil engineering, soils, soil-structure interaction, seismic response, earthquakes, seismic design, finite element method, dynamic response, damping, seismic analysis, shear wave velocity, foundations, numerical model, reinforced concrete, structural design, structural analysis, and design.

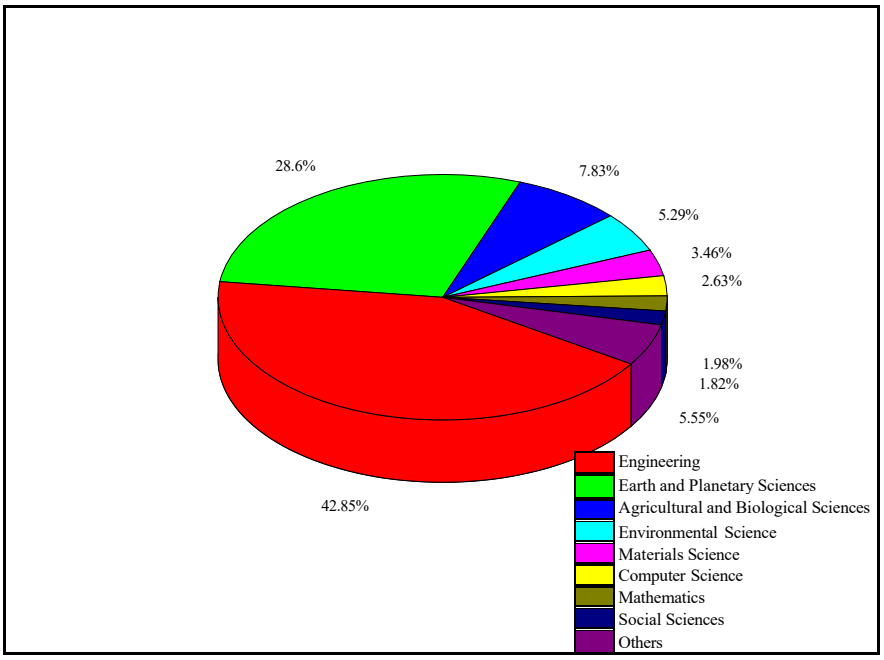


Figure 3 Document percentage by topic [23]

4.0 CONCLUSION

JCEST serves as a pivotal platform for disseminating cutting-edge research findings and fostering collaboration among researchers, academicians, and practitioners in the civil engineering field. By providing valuable insights into the latest knowledge and advancements in structural and earthquake engineering, the journal plays a crucial role in safeguarding the safety and resilience of our built environment.

It is an honour for the editors of JCEST to see and promote groundbreaking research contributions that influence the future of civil engineering. As seen by the data supplied, the journal's commitment to tackling the most sought-after issues and topics guarantees that it remains at the forefront of information dissemination in the field. Moving forward, JCEST will continue to facilitate the exchange of innovative ideas, encourage interdisciplinary collaborations, and drive the development of sustainable and resilient solutions for the challenges faced by civil engineers worldwide. By nurturing this academic community and supporting research endeavors, the journal aims to contribute to the advancement of the civil engineering profession and the betterment of our society and environment.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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