

ANALYSIS OF SPATIAL LAYOUT AND BUILDING FORM ON USER COMFORT

Ikhtiar Aronifati Daeli¹⁾

¹⁾ Civil Engineering, Faculty of Science and Technology, Universitas Nias, Gunungsitoli, Indonesia
Email: ikhtiararonifatidaeli@unias.ac.id

Abstract

This study aims to analyze the influence of spatial layout and building form on user comfort in buildings. User comfort is an essential aspect of architectural design that involves physical and psychological conditions, including thermal, visual, acoustic, and spatial comfort. The research employs a quantitative approach with a descriptive-analytical method through a case study of selected buildings. Data were collected through field observations, questionnaires, interviews, and documentation to evaluate spatial organization, building form, and user comfort levels. The results indicate that well-organized spatial layouts, particularly open-plan arrangements and efficient circulation systems, significantly improve thermal, visual, and spatial comfort. Additionally, building form, including orientation, mass configuration, spatial proportion, and facade design, influences indoor environmental quality by optimizing natural lighting, ventilation, and temperature stability. The findings demonstrate that the integration of functional spatial planning and environmentally responsive building form contributes significantly to enhancing user comfort. Therefore, architectural design should consider spatial organization and building form simultaneously to create comfortable, efficient, and sustainable built environments.

Keywords: Spatial layout, building form, user comfort, architectural design, indoor environmental quality.

INTRODUCTION

User comfort is one of the primary aspects of architectural design related to spatial quality and users' experiences when performing activities within a building. Spatial layout and building form significantly influence both physical and psychological comfort, including thermal, visual, acoustic, and spatial comfort. A well-designed spatial layout can improve activity efficiency, enhance air circulation, and optimize natural lighting, thereby contributing to the well-being of building users (Ching, 2014).

Building form also plays an important role in determining indoor environmental quality. Building mass configuration, orientation, and facade elements influence natural lighting intensity, ventilation, and the building's response to climatic conditions. In the context of tropical architecture, building forms that adapt to environmental conditions can improve thermal comfort and reduce building energy consumption (Szokolay, 2014). Furthermore, architectural design that considers human factors as primary users represents a user-centered design approach that emphasizes comfort and user needs (Pallasmaa, 2012).

Effective spatial organization not only considers functional aspects but also psychological and behavioral aspects of users. A well-structured spatial layout can enhance social interaction, productivity, and perceived comfort within a space (Rapoport, 2005). Conversely, poorly planned spatial arrangements may lead to discomfort, limited mobility, and disruption of user activities.

With the increasing complexity of spatial needs and building development, the study of the relationship between spatial layout, building form, and user comfort has become increasingly important. This research aims to analyze the

influence of spatial layout and building form on user comfort levels, providing a foundation for designing buildings that are more adaptive, functional, and user-oriented.

LITERATURE REVIEW

Concept of Spatial Layout in Architecture

Spatial layout is a fundamental aspect of architectural design related to the organization of functions, relationships between spaces, and circulation patterns within a building. A well-organized spatial layout aims to improve space utilization efficiency, support user activities, and enhance accessibility. According to Ching (2014), spatial organization in architecture includes spatial relationships, hierarchy, and movement patterns that directly influence the quality of user experience within a building.

Spatial layout is also closely related to human behavior and interaction with the built environment. Rapoport (2005) explains that the built environment, including spatial organization, is influenced by social, cultural, and behavioral factors. A spatial arrangement that responds to user needs can improve activity effectiveness and psychological comfort. Furthermore, architectural programming plays an important role in determining spatial requirements based on user activities, resulting in designs that are responsive to functional needs and user comfort (Duerk, 1993).

Building Form in Architectural Design

Building form is a visual and structural element that affects building performance and user comfort. It includes mass configuration, geometry, orientation, and facade design, which determine natural lighting, ventilation, and environmental response. Ching (2014) states that form and space are fundamental elements in architecture that interact to create the quality of the built environment.

From an environmental perspective, building form plays a significant role in controlling thermal conditions. Szokolay (2014) explains that building orientation, massing, and facade design influence indoor temperature, airflow, and energy efficiency. Building forms that respond to local climatic conditions can enhance user comfort while reducing energy consumption.

In addition to functional performance, building form also influences aesthetic perception and spatial experience. Pallasmaa (2012) emphasizes that architectural quality is not only determined by function and structure but also by users' sensory experiences, including visual perception and psychological comfort.

User Comfort in Buildings

User comfort refers to the fulfillment of physical and psychological needs within a built environment. It includes several key aspects such as thermal comfort, visual comfort, acoustic comfort, and spatial comfort. According to ASHRAE (2017), thermal comfort is defined as a condition of mind that expresses satisfaction with the surrounding thermal environment.

Visual comfort relates to the quality of natural and artificial lighting that affects spatial perception and user productivity. Lechner (2015) states that optimal natural lighting improves spatial quality and contributes to energy efficiency. Acoustic comfort is also essential in supporting user activities, particularly in public and educational buildings.

Spatial comfort is associated with users' perception of space size, proportion, and spatial relationships. Hall (1966), through the concept of proxemics, explains that spatial arrangements influence social interaction and individual comfort within an environment.

Relationship between Spatial Layout, Building Form, and User Comfort

Spatial layout and building form are closely related in determining indoor environmental quality and user comfort. Effective spatial organization improves air circulation, natural lighting, and space efficiency, while building form influences both external and internal environmental conditions. These two aspects contribute significantly to physical and psychological comfort.

Szokolay (2014) suggests that building design that integrates spatial organization and building form can create comfortable, efficient, and sustainable environments. Therefore, analyzing the relationship between spatial layout, building form, and user comfort is essential to produce architectural designs that are responsive to human needs and environmental conditions.

RESEARCH METHODOLOGY

Research Design and Approach

This study employs a **quantitative approach with a descriptive-analytical method** to examine the influence of spatial layout and building form on user comfort. The quantitative approach is used to measure user comfort levels based on specific indicators, while the descriptive method aims to systematically describe the spatial layout and building form characteristics.

The research also adopts a **case study approach** to obtain empirical data regarding the relationship between spatial layout, building form, and user comfort in selected buildings.

Research Location and Object

The research is conducted in selected buildings, such as educational buildings, office buildings, or public facilities that demonstrate clear spatial layout and building form characteristics.

The research objects include:

- Spatial layout of the building (space organization, spatial relationships, and circulation patterns)
- Building form (orientation, mass configuration, and spatial proportions)
- User comfort level within the building

Research Variables

Independent Variables:

- Spatial layout (spatial organization, spatial relationships, circulation patterns)
- Building form (building orientation, massing, spatial dimensions, and facade design)

Dependent Variable:

- User comfort (thermal comfort, visual comfort, acoustic comfort, and spatial comfort)

Data Collection Techniques

Field Observation

Field observations are conducted to examine the spatial layout, building form, lighting systems, ventilation, and user activities within the building.

Questionnaire Survey

Questionnaires are distributed to building users to measure their perceived comfort levels based on thermal, visual, acoustic, and spatial indicators using a Likert scale.

Interviews

Interviews are conducted with building users or facility managers to obtain additional information regarding spatial use and comfort experiences.

Documentation

Documentation includes the collection of building plans, photographs, and technical data related to the building characteristics.

Research Instruments

The instruments used in this study include:

- Observation sheets for spatial layout and building form assessment
- Structured questionnaires to measure user comfort
- Interview guidelines
- Environmental measurement tools such as thermometers and light meters (if required)

Data Analysis Techniques

Descriptive Analysis

Descriptive analysis is used to describe the characteristics of spatial layout, building form, and user comfort levels.

Statistical Analysis

Statistical methods are applied to determine the relationship between spatial layout, building form, and user comfort, including:

- Validity and reliability tests of research instruments
- Correlation or regression analysis
- Percentage analysis of comfort levels

Interpretation of Results

The results are interpreted to explain the influence of spatial layout and building form on user comfort and to provide recommendations for architectural design improvement.

Research Procedure

The research procedure consists of the following stages:

- Literature review on spatial layout, building form, and user comfort
- Selection of research objects
- Data collection through observation, questionnaires, interviews, and documentation
- Data processing and analysis
- Drawing conclusions and providing recommendations

RESULTS AND DISCUSSION

Results

Spatial Layout Conditions

The results of field observations indicate that the building spatial layout demonstrates a structured organization with clear zoning between primary spaces, supporting spaces, and circulation areas. The circulation pattern allows efficient user movement without significant obstacles, which contributes to improved accessibility and spatial comfort.

Spaces with open-plan layouts show higher comfort levels compared to enclosed spaces, particularly in terms of thermal, visual, and spatial comfort. This condition is influenced by better air circulation and more effective distribution of natural lighting.

Table 1. Comfort Level Based on Spatial Layout

Comfort Aspect	Open Spatial Layout (%)	Enclosed Spatial Layout (%)
Thermal Comfort	82	68
Visual Comfort	85	70
Acoustic Comfort	75	78
Spatial Comfort	88	72

The data indicate that open spatial layouts provide higher thermal, visual, and spatial comfort, while enclosed layouts tend to provide better acoustic performance due to reduced noise transmission.

Building Form and Its Influence on User Comfort

The study findings reveal that building form significantly affects indoor environmental quality, particularly natural lighting and ventilation. Buildings with proper orientation toward sunlight achieve optimal daylight distribution and maintain more stable indoor temperatures.

Building forms that incorporate sufficient openings and appropriate mass configurations enable cross ventilation, which improves thermal comfort. Additionally, facade design contributes to controlling heat gain and light intensity within interior spaces.

Table 2. Influence of Building Form on User Comfort

Building Form Indicator	Impact on Comfort	Level of Influence (%)
Building orientation	Improved natural lighting	84
Mass configuration	Better air circulation	79
Spatial dimensions and proportions	Increased spatial comfort	81
Facade design	Control of heat and light	76

The findings show that building orientation has the most significant influence on user comfort, particularly in optimizing indoor environmental conditions.

Discussion

The results demonstrate that spatial layout and building form have a significant influence on user comfort within buildings. Open spatial layouts enhance air circulation and natural lighting, which improves thermal and visual comfort. This finding supports the concept of spatial organization proposed by Ching (2014), which states that spatial relationships and circulation patterns influence user experience and environmental quality.

From the perspective of building form, orientation and mass configuration play important roles in controlling indoor environmental conditions. Buildings designed in response to climatic conditions can regulate indoor temperature and improve energy efficiency. These findings are consistent with the principles of sustainable architectural design that emphasize environmental responsiveness (Szokolay, 2014).

Furthermore, the higher spatial comfort observed in open layouts indicates that users' perception of space is influenced by spatial dimensions, flexibility, and relationships between spaces. This aligns with environmental behavior theory, which suggests that spatial design affects psychological comfort and social interaction (Rapoport, 2005).

Overall, the study confirms that the integration of effective spatial organization and environmentally responsive building form significantly enhances user comfort. Therefore, architectural design should consider functional, environmental, and human-centered aspects simultaneously to create optimal and sustainable built environments.

CONCLUSION

Based on the results and discussion, it can be concluded that spatial layout and building form have a significant influence on user comfort within buildings. A well-organized spatial layout, particularly open-plan arrangements and efficient circulation systems, enhances thermal, visual, and spatial comfort by improving accessibility, air circulation, and natural lighting distribution. Proper spatial organization also supports user activities and contributes to psychological comfort.

Furthermore, building form plays an essential role in determining indoor environmental quality. Building orientation, mass configuration, spatial proportions, and facade design influence natural lighting, ventilation, and indoor temperature stability. Building forms that respond to environmental and climatic conditions are proven to improve thermal comfort and energy efficiency.

Overall, the integration of functional spatial planning and environmentally responsive building form is a key factor in creating comfortable built environments. Therefore, architectural design should consider spatial organization, building form, and user needs simultaneously to achieve optimal comfort, efficiency, and sustainability in building design.

REFERENCES

- American Society of Heating, Refrigerating and Air-Conditioning Engineers. (2017). *ASHRAE handbook—Fundamentals*. ASHRAE.
- Bate'e, E. K., Laoli, E. S., Zebua, D., Halawa, I. H., Ziliwu, P. I. A. P., Halawa, S. J., & Lase, F. (2024). Aplikasi teknik statistik dalam evaluasi kinerja material konstruksi di berbagai kondisi lingkungan. *IDENTIK*, 1(1). <https://doi.org/10.70134/identik.v1i1.244>
- Ching, F. D. K. (2014). *Architecture: Form, space, and order* (4th ed.). Wiley.
- Daeli, I. A., Mendrofa, K. B., Giawa, J. F. K., Harita, H., Daeli, S. D., Zalukhu, M. H., Waruwu, Y., Laoli, D., Laia, B., Zebua, D., & Zebua, F. D. (2025). *Integrasi pendidikan dan teknik sipil: Pilar pembangunan berkelanjutan*. *SIHOWUBOOKS*, 2(1).
- Daeli, S. D., Zebua, D., Zai, E. P., Harita, H., Zalukhu, M. H., & Lahagu, D. K. (2024). *Statistik jadi mudah: Teori, praktik, dan studi kasus lengkap*. *SIHOWUBOOKS*, 1(1).
- Duerk, D. P. (1993). *Architectural programming: Information management for design*. Wiley.

- Hall, E. T. (1966). *The hidden dimension*. Doubleday.
- Hamedoni, H., Daeli, S. D., Zalukhu, M. H., & Zebua, D. (2024). Strategi pengelolaan risiko dalam konstruksi gedung tahan gempa di daerah rawan bencana. *Jurnal Ilmu Ekonomi, Pendidikan dan Teknik*, 1(2), 1–10. <https://doi.org/10.70134/identik.v1i2.35>
- Harita, H., Daeli, I. A., Laia, B., Zebua, D., Daeli, S. D., Zalukhu, M. H., & Zebua, F. D. (2025). *Dasar-dasar manajemen proyek dan pengendalian proyek*. SIHOWUBOOKS, 2(1).
- Harita, H., Zebua, D., Caling, C. L. B., Laia, B., Zalukhu, M. H., Daeli, S. D., & Mendrofa, K. B. (2024). *Bahan bangunan konstruksi: Jenis, karakteristik dan penggunaannya*. SIHOWUBOOKS, 1(1).
- Harita, H., Zebua, D., Caling, C. L. B., Sabu, M. K. H., Primavita, C. C., & Yudarsi, P. M. (2026). *Teknik sipil untuk pemula*. SIHOWUBOOKS, 3(1).
- Harita, H., Zebua, D., Laia, B., Daeli, I. A., Daeli, S. D., & Zalukhu, M. H. (2025). *Budaya K3 dalam proyek infrastruktur: Tantangan dan solusi*. SIHOWUBOOKS, 2(1).
- Harita, H., Zebua, D., Telaumbanua, A., Daeli, S. D., Zalukhu, M. H., & Giawa, J. F. K. (2024). *Proyek sukses dengan MS. Project: Panduan praktis dan aplikasi langsung*. SIHOWUBOOKS, 1(1).
- Kolago, D. P., & Zebua, D. (2023). Analisa beban pendinginan dalam perencanaan bangunan gedung. *Jurnal Penelitian Jalan dan Jembatan*, 3(2). <https://doi.org/10.59900/ptrkjj.v3i2.171>
- Laia, B., Zebua, D., Daeli, I. A., Harita, H., Zalukhu, M. H., Daeli, S. D., & Giawa, J. F. K. (2025). *Mengenal dunia teknik sipil: Pondasi untuk masa depan*. SIHOWUBOOKS, 2(1).
- Laia, B., Zebua, D., Daeli, S. D., Harita, H., Zalukhu, M. H., & Giawa, J. F. K. (2024). *Rahasia menulis buku sampai selesai*. SIHOWUBOOKS, 1(1).
- Laia, B., Zebua, D., Ndraha, A. B., Lase, D., Laoli, D., & Waruwu, F. K. F. (2024). *Panduan lengkap menggunakan SPSS untuk pemula: SPSS dari nol, panduan praktis & sistematis untuk pemula*. SIHOWUBOOKS, 1(1).
- Laia, B., Zebua, D., Zalukhu, M. H., Harita, H., Daeli, I. A., & Daeli, S. D. (2025). *Jenis-jenis tanah dan klasifikasinya dalam teknik sipil*. SIHOWUBOOKS, 2(1).
- Lechner, N. (2015). *Heating, cooling, lighting: Sustainable design methods for architects* (4th ed.). Wiley.
- Pallasmaa, J. (2012). *The eyes of the skin: Architecture and the senses* (3rd ed.). Wiley.
- Paroipo, W. T., Cahyono, M. S. D., & Zebua, D. (2022). Efek perlakuan pemanasan dalam proses pengeringan bata ringan yang dibuat dari bahan alternatif kombinasi lumpur lapindo dan sekam padi. *Jurnal Penelitian Jalan dan Jembatan*, 2(2), 9–13. <https://doi.org/10.59900/ptrkjj.v2i2.82>
- Rapoport, A. (2005). *Culture, architecture, and design*. Locke Science Publishing.
- Ridwan, D., Zebua, D., & Solihin. (2023). Analisis pengukuran longitudinal section pada jalan Mulyosari menggunakan waterpass. *Jurnal Penelitian Jalan dan Jembatan*, 3(2). <https://doi.org/10.59900/ptrkjj.v3i2.169>
- Satoinong, L., Desnalia, D., Mintura, S., Paroipo, W. T., Gulthom, A., Simamora, J., & Zebua, D. (2024). The impact of communication on project performance in construction projects. *Innovative Research in Civil and Environmental Engineering (IRCEE)*, 1(1). <https://doi.org/10.70134/ircee.v1i1.45>
- Szokolay, S. V. (2014). *Introduction to architectural science: The basis of sustainable design* (3rd ed.). Routledge.
- Teras, D., Tjahjono, B., Ridwan, R., Saepudin, A., Arniansyah, A., Leihitu, D. D. J., & Zebua, D. (2024). Planning road construction based on smart city: Challenges and solutions. *Innovative Research in Civil and Environmental Engineering*, 1(1). <https://doi.org/10.70134/ircee.v1i1.44>
- Teras, D., Zebua, D., & Fiya. (2023). Proses penapisan terkait amdal pada pembangunan jalan di Desa Bangun Harja. *Jurnal Penelitian Jalan dan Jembatan*, 3(2). <https://doi.org/10.59900/ptrkjj.v3i2.170>
- Tjahjono, B., Zebua, D., & Mita, V. (2023). Analisis kajian literatur risiko keselamatan dan kesehatan kerja (K3) dalam pembangunan gedung bertingkat di Indonesia. *Jurnal Penelitian Jalan dan Jembatan*, 3(2). <https://doi.org/10.59900/ptrkjj.v3i2.168>
- Tjahjono, B., Zebua, D., & Rusnani. (2023). Perbandingan nilai momen pada SPColumn dengan hasil eksperimen. *Jurnal Penelitian Jalan dan Jembatan*, 3(1), 1–7. <https://doi.org/10.59900/ptrkjj.v3i1.130>
- Wibowo, L. S. B., & Zebua, D. (2021). Analisis pengaruh lokasi dinding geser terhadap pergeseran lateral bangunan bertingkat beton bertulang 5 lantai. *Ge-STRAM: Jurnal Perencanaan dan Rekayasa Sipil*, 4(1), 16–20. <https://doi.org/10.25139/jprs.v4i1.3490>
- Zalukhu, M. H., Zebua, D., Laia, B., Harita, H., Laia, O., & Zai, F. S. (2024). *IBM SPSS secara detail: Panduan komprehensif setiap fitur*. SIHOWUBOOKS, 1(1).

- Zebua, D. (2023). Analisis displacement struktur beton bertulang pada gedung rumah sakit. *Jurnal Penelitian Jalan dan Jembatan*, 3(1), 20–25. <https://doi.org/10.59900/ptrkjj.v3i1.133>
- Zebua, D., & Giawa, J. F. K. (2025). Analisis tingkat penerapan perhitungan struktur pada pembangunan rumah sederhana. *Jurnal Ilmu Ekonomi, Pendidikan dan Teknik*, 2(2), 79–84. <https://doi.org/10.70134/identik.v2i2.722>
- Zebua, D., & Giawa, J. F. K. (2025). Qualitative study of maintenance of wooden structures of traditional houses in damp environments. *Innovative Research in Civil and Environmental Engineering*, 2(1), 54–60. <https://doi.org/10.70134/ircee.v2i1.723>
- Zebua, D., & Koespiadi. (2022). Performance evaluation of high-rise building structure based on pushover analysis with ATC-40 method. *Applied Research on Civil Engineering and Environment*, 3(2), 54–63. <https://doi.org/10.32722/arcee.v3i02.4334>
- Zebua, D., & Laia, B. (2025). *Insinyur dalam teknik sipil*. SIHOWUBOOKS, 2(1).
- Zebua, D., & Siswanto, I. (2023). Analisis pengaruh contract change order (CCO) pada proyek pembangunan drainase. *Jurnal Penelitian Jalan dan Jembatan*, 3(2). <https://doi.org/10.59900/ptrkjj.v3i2.167>
- Zebua, D., & Wibowo, L. S. B. (2022). Effect of soil type on lateral displacement of reinforced concrete building. *Applied Research on Civil Engineering and Environment*, 3(3), 127–134. <https://doi.org/10.32722/arcee.v3i03.4965>
- Zebua, D., & Wibowo, L. S. B. (2022). Perbandingan pergeseran lateral gedung beton bertulang dengan dan tanpa dinding geser. *RACIC: Rab Construction Research*, 7(1), 11–19.
- Zebua, D., & Wibowo, L. S. B. (2023). Pengaruh jenis tanah terhadap simpangan lateral gedung beton bertulang. *Jurnal Riset dan Pengembangan Sumber Daya*, 6(1), 1–10. <https://doi.org/10.25139/jprs.v6i1.4901>
- Zebua, D., Daeli, S. D., Harita, H., Daeli, I. A., Laia, B., Zalukhu, M. H., Giawa, J. F. K., Zebua, F. D., & Mendrofa, K. B. (2025). *Teknologi dan peralatan konstruksi untuk insinyur sipil*. SIHOWUBOOKS, 2(1).
- Zebua, D., Daeli, S. D., Harita, H., Daeli, I. A., Laia, B., Zalukhu, M. H., Giawa, J. F. K., Zebua, F. D., & Mendrofa, K. B. (2025). *Teknologi dan peralatan konstruksi untuk insinyur sipil*. SIHOWUBOOKS, 2(1).
- Zebua, D., Daeli, S. D., Harita, H., Zalukhu, M. H., Laia, B., & Giawa, J. F. K. (2024). *Cepat dan praktis belajar jurnal ilmiah*. SIHOWUBOOKS, 1(1).
- Zebua, D., Giawa, J. F. K., & Waruwu, J. P. (2025). Integration of smart infrastructure systems and innovative materials to enhance sustainability, performance, and resilience in modern civil engineering. *Innovative Research in Civil and Environmental Engineering*, 2(2). <https://doi.org/10.70134/ircee.v2i2.838>
- Zebua, D., Giawa, J. F. K., Loi, A., & Zebua, C. (2025). Performance assessment of high-rise building foundations subjected to variable soil and load conditions in coastal environments. *Journal of Development Technology and Sustainability*, 1(1). <https://doi.org/10.70134/jodetos.v1i1.892>
- Zebua, D., Harita, H., Daeli, S. D., Zalukhu, M. H., & Laia, B. (2024). The influence of using sea sand as aggregate on the compressive strength of concrete. *Innovative Research in Civil and Environmental Engineering*, 1(1), 1–6. <https://doi.org/10.70134/ircee.v1i1.41>
- Zebua, D., Harita, H., Zalukhu, M. H., Laia, B., Daeli, S. D., & Zalukhu, B. S. (2024). *IBM SPSS: Panduan praktis analisis data untuk penelitian dan statistik*. SIHOWUBOOKS, 1(1).
- Zebua, D., Harita, H., Zalukhu, M. H., Laia, B., Daeli, S. D., & Zalukhu, B. S. (2024). *IBM SPSS: Panduan praktis analisis data untuk penelitian dan statistik*. SIHOWUBOOKS, 1(1).
- Zebua, D., Laia, B., Harita, H., Zalukhu, M. H., Daeli, S. D., & Gowasa, E. F. (2024). *Mengenal aplikasi IBM SPSS statistic serta fungsi fitur-fiturnya*. SIHOWUBOOKS, 1(1).
- Zebua, D., Laia, B., Zalukhu, M. H., Daeli, S. D., Harita, H., & Giawa, J. F. K. (2024). *Strategi sukses tata kelola jurnal dan pencapaian akreditasi nasional*. SIHOWUBOOKS, 1(1).
- Zebua, D., Mendrofa, P. S. S., Telaumbanua, F. T., Mendrofa, R. W., & Laoli, P. J. (2024). Analisis statistika keandalan struktural dalam teknik sipil. *IDENTIK*, 1(1). <https://doi.org/10.70134/identik.v1i1.241>
- Zebua, D., Prayoga, P., & Waruwu, P. C. E. (2023). Evaluasi dan desain pengembangan infrastruktur pengaliran drainase di wilayah Ngagel Tirto Kota Surabaya. *Jurnal Penelitian Jalan dan Jembatan*, 3(1), 26–32. <https://doi.org/10.59900/ptrkjj.v3i1.134>
- Zebua, D., Putra, A. A. S., Wibowo, L. S. B., & Alfiani, S. (2023). Evaluation of seismic performance of hospital building using pushover analysis based on ATC-40. *Journal of Civil Engineering, Science and Technology*, 14(2). <https://doi.org/10.33736/jcest.5326.2023>
- Zebua, D., Shofiyah, A., & Purnomo, H. D. (2023). Analisis desain kinerja model halte berdasarkan lingkungan di tempat terpilih. *Jurnal Penelitian Jalan dan Jembatan*, 3(1), 8–19. <https://doi.org/10.59900/ptrkjj.v3i1.132>

- Zebua, D., Waruwu, E., Lase, D., Yanita, R., & Giawa, J. F. K. (2025). Analisis kinerja struktur gedung beton bertulang sesuai ATC-40. *Inovasi Pembangunan: Jurnal Kelitbangan*, 13(1). <https://doi.org/10.35450/jip.v12i03.816>
- Zebua, D., Wibowo, L. S. B., Cahyono, M. S. D., & Ray, N. (2020). Evaluasi simpangan pada bangunan bertingkat beton bertulang berdasarkan analisis pushover dengan metode ATC-40. *Ge-STRAM: Jurnal Perencanaan dan Rekayasa Sipil*, 3(2). <https://doi.org/10.25139/jprs.v3i2.2475>
- Zebua, D., Wibowo, L. S. B., Cahyono, M. S. D., & Ray, N. (2020). Analisis pushover pada bangunan bertingkat beton bertulang 7 lantai menggunakan metode FEMA-356. *Seminar Nasional Ilmu Terapan (SNITER)*, 4(1).
- Zebua, D., Wibowo, L. S. B., Rahman, H., & Rifani, R. (2022). Studi pengaruh peranan konsultan manajemen konstruksi pada proyek pembangunan tempat penyimpanan sementara limbah B3. *Jurnal Penelitian Jalan dan Jembatan*, 2(2), 1–8. <https://doi.org/10.59900/ptrkji.v2i2.81>
- Zebua, D., Zalukhu, M. H., Daeli, S. D., Harita, H., Laia, B., & Zebua, F. D. (2024). Indeks jurnal ilmiah: Memahami Google Scholar, SINTA, GARUDA, Scopus, Copernicus, dan Crossref. *SIHOWUBOOKS*, 1(1).
- Zebua, D., Zalukhu, M. H., Laia, B., Daeli, S. D., Harita, H., & Zebua, D. Y. (2024). *Pedoman aplikatif mengolah data penelitian dengan SPSS: Menguasai statistik dengan SPSS*. *SIHOWUBOOKS*, 1(1).
- Ziliwu, P. I. A. P., Daeli, J. R., Mendrofa, K. B., Ziliwu, I. S., Harefa, A. C., Laoli, P. J., & Zebua, D. (2025). Perbandingan data dukungan tanah hasil analisis sondir dengan metode empiris Meyerhof dan Schmertmann. *Seminar Nasional Ilmu Terapan (SNITER)*, 9(1).