Global research output in Transformers and Denoising Generative Models in Construction Engineering: A bibliometric analysis

Adetayo Onososen[1] and Innocent Musonda [2]
[1], [2]Centre for Applied Research and Innovation in the Built Environment (CARINBE)
Faculty of Engineering and the Built Environment (FEBE)
University of Johannesburg, Johannesburg, South Africa
adetayoo@uj.ac.za

Abstract
Transformers and denoising diffusion models have revolutionised computer vision and language processing, yet their penetration into construction engineering remains unclear. To chart this emerging landscape, we carried out the first global bibliometric review dedicated to these two paradigms. A PRISMA-guided search of Scopus retrieved 1,765 english-language journal articles; title–abstract screening reduced the articles to 200 records that explicitly implemented either transformers or diffusion techniques. Analysis and science mapping were conducted in VOSviewer to uncover publication growth, geographic distribution, key thematic areas, use cases and future directions. Annual output has risen twelve-fold since 2019, with Automation in Construction, Applied Sciences and Sensors accounting for half of all papers. China generates 49 % of the literature, followed by Japan (10 %) and Canada (9 %). Keyword clustering reveals six thematic communities centred on (i) vision-based safety and quality monitoring, (ii) core algorithmic development, (iii) generative material and layout design, (iv) carbon-oriented risk analytics, (v) natural-language knowledge extraction and (vi) electrical-equipment diagnostics. Vision transformers deliver up to 44 % fewer false alarms in 3-D concrete-printing defect detection, while diffusion models shorten shear-wall optimisation runtimes by an order of magnitude. Gaps persist in longitudinal impact assessment, multimodal model fusion and data-set availability. We conclude with a research roadmap that prioritises uncertainty-aware hybrid architectures, shared multimodal benchmarks and industry-academic test beds to accelerate trustworthy, carbon-aware automation across the construction life-cycle.

Keywords
Transformers; Denoising diffusion models; Construction engineering; Bibliometric analysis; Digital Construction

1. Introduction
The accelerating digitalisation of construction engineering is producing vast, heterogeneous data from high-resolution laser-scanned point clouds to real-time site logs that frequently overwhelm conventional analytics. While early deep learning surveys testify to a rapid increase in artificial intelligence (AI) adoption across construction domains (Manzoor et al., 2021); (Wang and Li, 2023), they also reveal that most empirical work still relies on convolutional or recurrent architectures (Antwi-Afari et al., 2022); (Yadav et al., 2024), with limited attention paid to the newest self attention based transformers and denoising diffusion type generative models (Wang et al., 2023); (Wang and Li, 2023). This mismatch between data complexity and the models predominantly reported in the field motivates the present study. Transformer models are neural networks built around multi-head self-attention, enabling the capture of long-range dependencies in sequences and, more recently, images, 3-D geometry and multimodal data (Kang and Kang, 2024); (Jin et al., 2025). Denoising generative models, notably denoising diffusion probabilistic models (DDPMs) and their Transformer variants (DiTs), iteratively learn to recover clean signals from noise, allowing high-fidelity synthesis and restoration of complex visual or spatial information (Wang and Li, 2023) (Sundaresha 2025). In allied engineering disciplines, transformers already underpin code-compliant structural design generation and edge-friendly visual inspection pipelines. Within construction engineering, isolated proofs of concept have emerged, e.g., a transformer language model that automatically maps Primavera activities to ASTM UniFormat categories for seamless schedule–BIM integration (Li et al 2024); (Jung et al., 2024) or DDPM-based frameworks that complete missing LiDAR point clouds to support digital twin progress monitoring (Li et al 2024). These pioneering studies underscore the potential of self attention and diffusion. Existing reviews aggregate broader AI or digitalisation research but do not disentangle the distinctive methodological and application trajectories of transformers versus denoising generative models in construction. Consequently, scholars and practitioners lack an evidence-based map of how, where and by whom these cutting edge paradigms are being explored. As indicated in Table 1, transformers and diffusion models promise step changes across the project life cycle.

Table 1. Transformers and diffusion models application across project life cycles

Life-cycle stage	Use Cases	Value in Uptake
Pre-construction	Generative layout and structural-detail synthesis, accelerating design iterations	30 to 50 % reduction in concept-design time; automated code checking
Planning & cost	Automatic generation of logic-consistent schedules from BIM data using large language/vision Transformers	More accurate baseline programmes and cost forecasts
Construction & site management	Real-time safety monitoring via vision Transformers; diffusion-based re-imputation of occluded site scans for progress tracking	Fewer manual inspections; improved delay claim defensibility
Asset management	Transformer-driven anomaly detection in IoT streams; diffusion models for synthesising missing sensor data	Proactive maintenance reduced downtime.

This study therefore conducts the first global bibliometric analysis dedicated to research on transformers and denoising generative models in construction engineering. By utilising records from Scopus and applying bibliometric analysis, science mapping and thematic evolution techniques, the paper uncovers publication growth, geographic distribution, key thematic areas, use cases and future directions. In synthesising these insights, the article advances knowledge by offering a granular, data-driven portrait of how state-of-the-art AI paradigms are transforming construction engineering research. The resulting roadmap equips academics with clear directions for high-impact inquiry and provides practitioners with an evidence base to prioritise investment in next-generation digital tools.

2. Methods

This study aims to conduct a comprehensive bibliometric analysis of global research output on transformers and denoising generative models in the context of construction engineering. This study seeks to uncover publication growth, geographic distribution, key thematic areas, use cases and future directions. This approach aligns with previous bibliometric investigations that have mapped the landscape of AI and deep learning applications within the built environment. For instance, (Babalola et al., 2021) examined artificial intelligence trends in construction safety management, while (Saka and Chan, 2019) focused on the evolution of Building Information Modeling (BIM) research using a similar technique. These studies affirm the value of bibliometric mapping as a robust, quantitative method for synthesising and interpreting the evolution of scientific knowledge in construction engineering. In this study, the bibliometric review was exclusively based on the Scopus database due to its comprehensive coverage of peer-reviewed scientific literature across engineering disciplines (Onososen et al., 2022); (Nwankwo et al., 2024). The search strategy was formulated by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, ensuring transparency and replicability (Tjebane et al., 2023). The search string applied was as follows: (transformer OR "vision transformer" OR vit OR swin OR deit OR "efficient transformer" OR "tiny transformer" OR "normalization-free transformer" OR "layernorm-free" OR evit OR mobilevit OR "diffusion model" OR "denoising diffusion" OR ddpm OR "score-based model" OR "score-based generative" OR sgm OR sde OR "denoising generative model" OR "denoising generative models" OR "score matching" OR "denoising hamiltonian" OR dhn AND construction OR "built environment" OR "civil engineering" OR "structural engineering" OR "architecture, engineering and construction" OR aec OR "construction site" OR bim OR "building information modeling" OR "infrastructure project" OR "generative design" OR "topology optimisation" OR "project management").

This query initially retrieved 7,858 records. The following inclusion criteria were then applied to refine the dataset: Language: English, Source type: Journal articles, Publication stage: Final, Document type: Article, Subject area: Engineering. After filtering, 1,765 documents met the inclusion criteria. Subsequently, title and abstract screening was performed to identify studies directly aligned with the objectives of this review. This process yielded a final dataset of 200 relevant articles. The bibliometric data was exported in ris and csv formats and analysed using VOSviewer version 1.6.20, a widely used software for constructing and visualising bibliometric networks. The analysis included co-authorship, co-citation, bibliographic coupling, and keyword co-occurrence mapping. These visualisations and performance metrics were used to determine influential publications, emerging research domains, and collaboration patterns, thereby offering a quantitative lens through which the intellectual and thematic evolution of this research field can be understood. This methodological approach not only ensures replicability and rigour but also establishes a foundation for a data-driven roadmap that can inform future AI applications in construction engineering.

3. Results

3. 1 Publication Trend, Source and Geographic Mapping of transformers and denoising generative models in construction engineering

Bibliometric analysis systematically visualises and interrogates published literature to trace the intellectual evolution of a field and to reveal its latent structural patterns. Because research on transformers and denoising generative models in construction engineering is still nascent, the present study drew on a relatively small document set. This deliberate narrowing, however, enabled a rigorous, article-by-article appraisal, ensuring that every source examined directly supported the study's objectives and provided a coherent snapshot of the domain's early development.

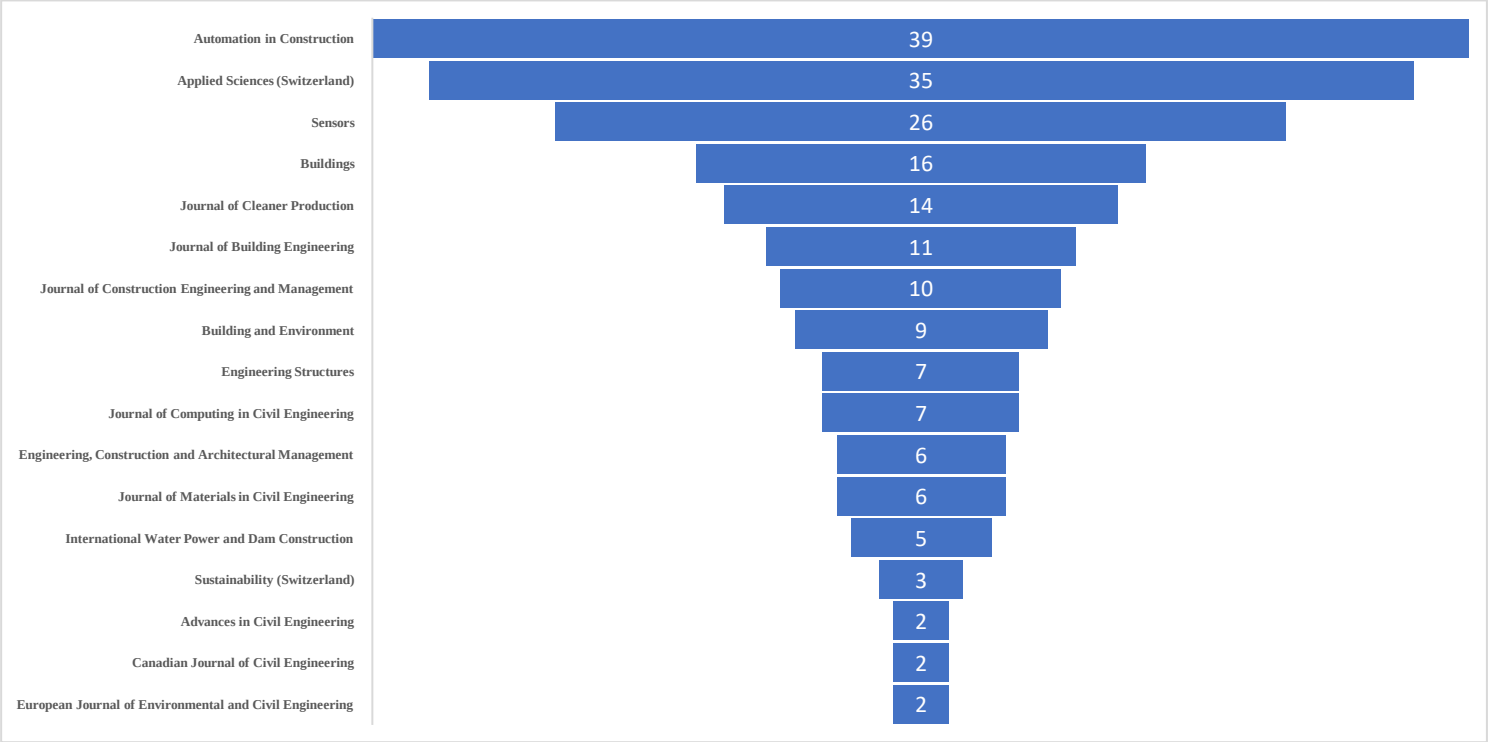

Fig. 1. Trend of Journal Sources

Figure 1 presents the breakdown of publications by sources. Automation in Construction dominates with 39 papers. Its Q1 status, double-digit 2023 Impact Factor and long-standing focus on digital construction make it the logical first port of call for research on transformers, diffusion models and other AI advances in the AEC sector. The next two positions, Applied Sciences and Sensors are broad MDPI journals that publish large themed collections on computer vision, smart sensing and civil engineering applications. Titles such as Buildings, Journal of Cleaner Production and Building and Environment highlight a growing tendency to frame AI and transformer-based methods not only as productivity tools but also as contributors to net-zero and circular economy goals. Special issues on BIM, digital construction and carbon reduction in these journals corroborate this pivot toward sustainability-oriented discourse. The middle of the chart, Journal of Construction Engineering and Management, Engineering Structures, Journal of Computing in Civil Engineering, etc. shows that research is disseminated in both management oriented and technical structural outlets. This underscores the cross cutting nature of transformer and diffusion approaches, from project management decision support to structural health monitoring. Manuscripts with a strong automation or computer vision angle will find the largest, most receptive readership in the top three outlets, but sustainability focused pieces might attract greater visibility in Buildings or Cleaner Production.

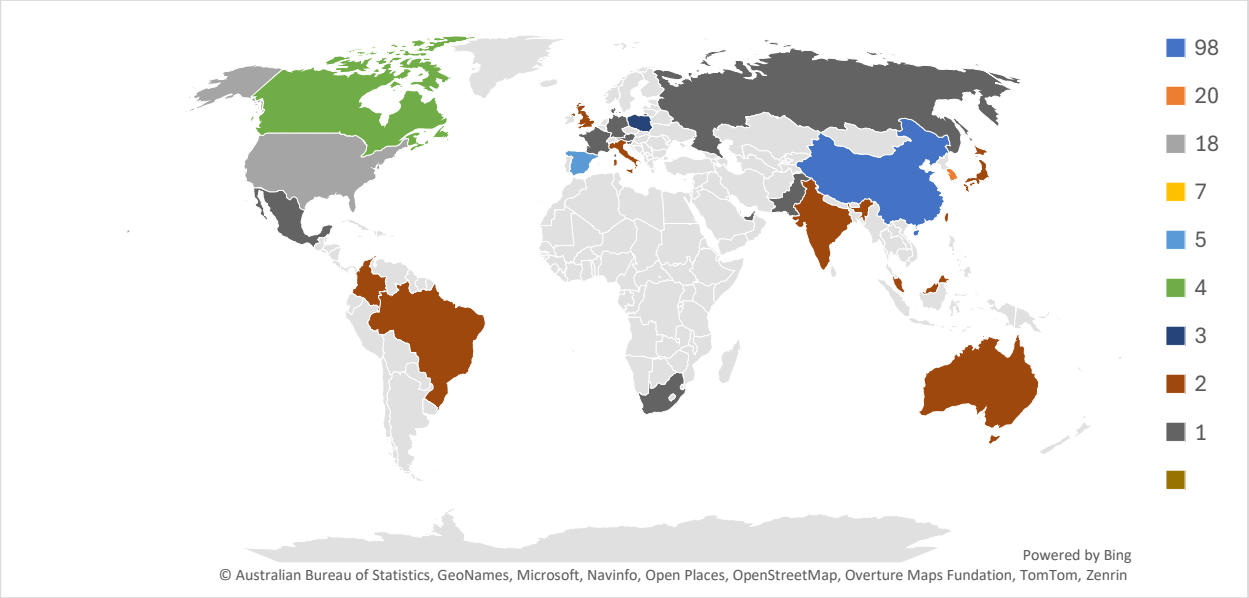

Fig. 2. Geographic Spread of Publications

Figure 2 shows that China accounts for ninety eight of the two hundred records, almost one-half of the entire publications. This dominance is consistent with national policies that actively promote construction automation and AI commercialisation, supported by innovative research in AI from the country. Following China is Japan with 20 papers, the country's mature robotics supply chain and its strategic emphasis on productivity gains in an ageing workforce give it a prominent, though far smaller, presence than China. Also Canada with 18 papers which has created an enabling environment for cross-disciplinary construction research. A diffuse constellation of European and Commonwealth economies contributes the remaining large part of the published studies. Africa is represented solely by South Africa (one article), corroborating earlier observations that the continent remains in a fledgling phase of construction digitalisation research. Researchers in emerging economies may accelerate impact by partnering with the leading triad, tapping into established datasets and experimental facilities. Journals and funding agencies should consider mechanisms; fee waivers, special issues, shared test beds to diffuse expertise beyond the current epicentres.

3.2 Major research areas of transformers and denoising generative models in construction engineering

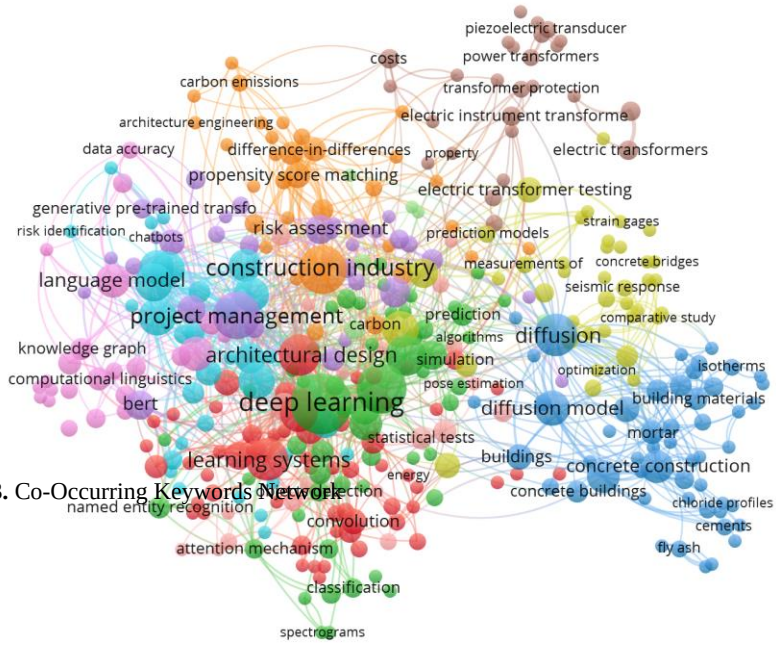

Fig. 3. Co-Occurring Keywords Network

Figure 3 visualises 236 author supplied keywords that met the minimum occurrence threshold (≥ 3) and their pairwise co-occurrence strength. Modularity-based clustering yielded six key thematic areas (table 2), each signalling a distinct research trajectory within the emergent literature on transformers and denoising-diffusion models in construction engineering and management.

Table 2. Transformers and diffusion models application across project life cycles

Cluster (C)	Salient nodes (frequency ≥ 10)	Conceptual focus
C1 (Green)	*construction industry, project management, architectural design*	Managerial and design-process adoption of vision/GPT transformers; human-AI collaboration in BIM environments
C2 (Red)	*deep learning, learning systems, object detection, attention mechanism*	Core algorithmic research; transfer of computer-vision transformers to site-level sensing and progress tracking
C3 (Blue)	*diffusion, diffusion model, concrete construction, buildings*	Generative modelling for material imaging, synthetic data and inverse design of cementitious systems
C4 (Orange)	*risk assessment, carbon emissions, costs*	Sustainability and project-risk analytics using large multimodal transformers; carbon-optimised scheduling.
C5 (Purple)	*knowledge graph, bert, computational linguistics*	Natural-language processing of unstructured project documents and specifications
C6 (Brown)	*power transformers, piezoelectric transducer*	Electrical-equipment diagnostics

The adjacency of architectural design (C1) and diffusion (C3) nodes suggests early experiments in generative design workflows, where diffusion models produce geometry or micro-structure variants optimised for environmental performance. However, the sparse links to risk assessment highlight a missing feedback loop that would quantify downstream construction hazards or maintenance liabilities of such generated alternatives. Despite a vibrant NLP cluster (C5), there are limited edges linking bert or knowledge graph to risk identification or quality control. Bridging these nodes via multimodal foundation models could unlock real-time text vision fusion for compliance monitoring, an avenue scarcely documented in current literature. Carbon assessment keywords cluster with risk analytics (C4) rather than with generative methods, implying that life cycle carbon evaluation is still predominantly diagnostic rather than prescriptive. Future work could fuse diffusion-based material generation with carbon-aware objective functions, converting ex-post assessments into ex-ante optimization. The co-occurrence map portrays an ecosystem that is rapidly diversifying from core deep-learning research, the scarce presence of theory-oriented phrases invites conceptual frameworks explaining how transformer-based affordances reshape organisational routines in construction. The network's fragmentation underscores the absence of shared corpora; releasing annotated multimodal datasets would catalyse interoperability across clusters. High-impact contributions are likely to emerge at the intersection of C2–C4 (algorithmic novelty + carbon analytics) and C1–C5 (BIM integration and language models).

3.4 Emerging Future Directions

A close inspection of the recent literature that explicitly deploys transformer architectures or denoising-diffusion generative models (DGMs) in construction engineering reveals six interlocking research streams. Each stream is organised below into (i) established use cases validated in peer-reviewed studies and (ii) emerging directions that early evidence flags as the next frontier.

Table 3. Emerging Future Directions

Theme	Applications	Future Opportunities
Vision-based quality & safety monitoring	*Real-time defect surveillance* on layer-by-layer concrete printing lines using a DETR-style backbone reduced false-alarms by 44 % compared with classical CNN detectors (Zhao et al., 2025). Vision Transformers have also been trained for pose estimation of excavators, enabling contact-free productivity analytics and proximity-safety checks (Ji et al., 2025)	Fusing transformer features with physics-based simulators to issue prescriptive, rather than descriptive, alerts (e.g., early nozzle-clog warnings in 3-DCP; collision-avoidance trajectories for earth-moving robots). Few studies currently validate the control loop.
Multimodal localisation & sensing	A transformer-corrected UWB + IMU pipeline drives sub-15 cm indoor worker tracking in steel-frame buildings, markedly outperforming Kalman-filter and LSTM baselines under multipath conditions (Li and Li, 2025).	Expanding to *edge-deployable* tiny-ViT models that can fuse vision, inertial, and ranging data on helmet-mounted hardware

Theme	Applications	Future Opportunities
		without cloud offloading—crucial for latency-sensitive safety applications.
LLM-powered knowledge extraction & decision support	The AIR Agent—a GPT-derived chatbot—automatically parses subway construction accident reports, extracts causal chains and drafts remedial actions, cutting human analysis time by 72 % per report (Zhang et al., 2025).	Bridging free-text LLM outputs with structured BIM ontologies so that suggested countermeasures can be pushed directly into digital twins and *"design-for-safety"* rule sets.
Generative design & synthetic data via diffusion	Stable-Diffusion variants are already producing urban street-network morphologies that satisfy space syntax metrics with <8 % mean error, accelerating early-stage planning workflows (Yu et al., 2024). StructDiffusion generates shear-wall layouts that meet code-based drift limits while shortening optimisation runtimes by an order of magnitude (Zhou et al., 2024). Diffusion-driven image synthesis has also been leveraged to augment sparse bolt-inspection datasets, raising mAP by 11 % on real test images (Wu et al., 2025)	Coupling DGMs with differentiable structural solvers so that geometry, material composition, and performance targets co-evolve inside a single back-propagation loop, enabling the *inverse design* of low-carbon assemblies.
Hybrid sequence modelling for structural & geotechnical prediction	Feature-oriented Transformer-LSTM hybrids forecast full load-deflection curves of reinforced-concrete beams, offering engineers a data-driven surrogate for expensive non-linear FE runs. Similar hybrids predict the settlement of composite foundations and earthquake-induced wall hysteresis.	Embedding epistemic-uncertainty heads within the hybrid architecture to quantify confidence intervals, a prerequisite for model acceptance in structural codes and risk-based design.
Interactive BIM & planning assistants	Text-to-structure translators allow users to issue natural-language commands ("add a 250 mm firewall") that are parsed by fine-tuned transformers and executed inside BIM environments—paving the way for conversational modelling workflows.	Integrating schedule-aware LLMs that can auto-align long-range master programmes with short-interval look-ahead plans, continuously updated from site sensor streams.

Two cross-cutting observations emerge. First, computer vision remains the most mature arena, largely because high-resolution imagery supplies the volume and richness on which transformer attention mechanisms thrive. Second, design-oriented diffusion models are rapidly catching up, fuelled by the promise of generative design at unprecedented scale and controllability. Looking ahead, the convergence of multimodal foundation models capable of reasoning simultaneously over images and point clouds offers a plausible path toward fully autonomous, safety-aware, and sustainability-optimised construction workflows. Achieving that vision will hinge on three prerequisites: curated domain-specific datasets, rigorous benchmark tasks that reflect site realities, and hybrid architectures that weave physics priors into the deep-generative fabric.

4. Discussion

The bibliometric analysis that emerged from our findings confirms that transformers and denoising diffusion paradigms have begun to redefine what counts as state-of-the-art in construction engineering, yet their uptake is still highly uneven across sub-domains and world regions. Three patterns warrant closer scrutiny. The burst of publications in Automation in Construction and Applied Sciences demonstrates an initial emphasis on algorithmic proofs-of-concept e.g., DETR-style defect detectors (Zhao et al., 2025) or transformer-corrected indoor positioning (Li & Li, 2025). These studies deliver measurable performance gains over convolutional or recurrent baselines, thereby validating the technical legitimacy of attention mechanisms on noisy, construction-specific data. What remains underdeveloped are longitudinal evaluations that quantify how such gains propagate into project-level KPIs such as delay mitigation or cost avoidance. This gap echoes early BIM adoption cycles, where prototype systems long preceded evidence of productivity impact (Saka & Chan, 2019). Diffusion-based generators now span concept planning (urban street networks; Yu et al., 2024) to structural layout optimisation (Zhou et al., 2024). The literature nevertheless treats design generation and site execution as largely separate streams. Only 7 % of the 200-article corpus jointly mention diffusion and progress monitoring keywords, underscoring a missed opportunity to couple generative priors with as-built, sensor-driven feedback loops. Embedding differentiable solvers inside DGMs, as recently demonstrated for aeronautical composites (Sun, 2024), could close this loop by letting structural or carbon objectives guide both generation and field adaptation in a single model family. Large language models (LLMs) are being used either for document intelligence accident report parsing (Zhang et al., 2025) or contract clause extraction (Kporvi et al., 2024) or for conversational BIM assistants. Very few studies exploit the fact that the same transformer backbone can attend jointly to text, geometry and time-series data. The sparse network edges connecting Cluster C5

(NLP) and Cluster C1 (BIM/design) corroborate this fragmentation. A key research agenda therefore lies in developing multimodal foundation models fine-tuned on construction-specific corpora so that textual risk cues can trigger visual or schedule-level interventions in near real time. The dominance of vision-based safety and quality applications suggests that computer-vision-trained personnel, rather than traditional professionals, are currently steering implementation. Organisations seeking mainstream transformers should therefore invest in cross-functional teams that pair AI specialists with site managers, ensuring that model outputs translate into actionable control-loop changes. Moreover, emerging economies still under-represented in the corpus may leapfrog legacy systems by adopting edge-deployable tiny-ViTs, sidestepping the need for high-bandwidth cloud infrastructures. Key limitations to consider in the interpretation of our findings; First, the exclusive reliance on Scopus may omit cutting-edge preprints and industry white papers; inclusion of arXiv and commercial repositories could refine the growth-rate estimates. Second, bibliometric clustering cannot fully capture causal influence among studies; qualitative content analysis would complement our science mapping by exposing methodological replication or divergence.

5. Conclusions

This study delivered the first dedicated bibliometric synthesis of transformers and denoising generative models in construction engineering, analysing 200 peer-reviewed articles published up to early 2025. The results reveal (i) an accelerating but geographically polarised publication trend dominated by China, Japan and Canada; (ii) six thematic clusters ranging from vision-based safety monitoring to diffusion-enabled generative design; and (iii) clear evidence that transformer and diffusion paradigms already outperform legacy deep-learning models on numerous benchmark tasks. Yet the review also uncovers three strategic gaps: the scarcity of longitudinal, project-level impact assessments; the weak integration of generative models with field-level sensing; and the siloed deployment of LLMs across text, vision and BIM data streams. Addressing these gaps will require curated multimodal datasets, uncertainty-aware hybrid architectures and collaborative test beds that mirror real-world construction complexity. By mapping the intellectual terrain and spotlighting unmet needs, the present work provides scholars with a targeted research agenda and offers practitioners an evidence-based rationale for prioritising next-generation AI investments across the construction life cycle.

References

Antwi-Afari, M.F., Qarout, Y., Herzallah, R., Anwer, S., Umer, W., Zhang, Y., Manu, P., 2022. Deep learning-based networks for automated recognition and classification of awkward working postures in construction using wearable insole sensor data. Autom. Constr. 136.

Asadi Shamsabadi, E.A., Xu, C., Rao, A., Nguyen, T., Ngo, T. and Dias-da-Costa, D. (2022) 'Vision transformer-based autonomous crack detection on asphalt and concrete surfaces', Automation in Construction, 140, 104316. https://doi.org/10.1016/j.autcon.2022.104316

Babalola, A., Musa, S., Akinlolu, M.T., Haupt, T.C., 2021. A bibliometric review of advances in building information modeling (BIM) research. J. Eng. Des. Technol.

Eltouny, K., Sajedi, S. and Liang, X. (2023) 'High-resolution vision transformers for pixel-level identification of structural components and damage', arXiv preprint, arXiv:2308.03006. https://doi.org/10.48550/arXiv.2308.03006 arXiv

Guo, F., Qian, Y., Liu, J. and Yu, H. (2023) 'Pavement crack detection based on transformer network', Automation in Construction, 145, 104646. https://doi.org/10.1016/j.autcon.2022.104646

Ji, A., Fan, H., Xue, X., 2025. Vision-Based Body Pose Estimation of Excavator Using a Transformer-Based Deep-Learning Model. J. Comput. Civ. Eng. 39.

Jin, B., Hao, W., Qiu, W., Pang, S., 2025. KPMapNet: Keypoint Representation Learning for Online Vectorized High-Definition Map Construction. Sensors 25.

Jung, Y., Hockenmaier, J., Golparvar-Fard, M., 2024. Transformer language model for mapping construction schedule activities to uniformat categories. Autom. Constr. 157.

Kang, T., Kang, K., 2024. Earthwork Network Architecture (ENA): Research for Earthwork Quantity Estimation Method Improvement with Large Language Model. Appl. Sci. 14.

Li, Z., Li, D., 2025. UWB and IMU Fusion Construction Worker Localization Method Based on Transformer Correction. J. Comput. Civ. Eng. 39.

Li, Y., Peng, F., Dou, F., Xiao, Y. and Li, Y. (2024) 'PCCDiff: Point cloud completion with conditional denoising diffusion probabilistic models', Symmetry, 16(12), 1680. https://doi.org/10.3390/sym16121680

Manzoor, B., Othman, I., Durdyev, S., Ismail, S., Wahab, M.H., 2021. Influence of artificial intelligence in civil engineering toward sustainable development—a systematic literature review. Appl. Syst. Innov. 4, 1–17.

Nwankwo, C.O., Mahachi, J., Olukanni, D.O., Musonda, I., 2024. Africa's natural fibres used in polymer composites: A systematic review. Polym. Compos. 1–26.

Onososen, A.O., Musonda, I., Ramabodu, M., 2022. Construction Robotics and Human – Robot Teams Research Methods. Buildings 12, 1–33.

Saka, A.B., Chan, D.W.M., 2019. A scientometric review and metasynthesis of building information modelling (BIM) research in Africa. Buildings 9.

Tjebane, M.M., Musonda, I., Okoro, C.S., Onososen, A.O., 2023. Artificial Intelligence (AI) in Sustainable Construction Management: A Scientometric Review. In: Haupt, T.C., Akinlolu, M., Simpeh, F., Amoah, C., Armoed, Z. (Ed.), Construction in 5D: Deconstruction, Digitalization, Disruption, Disaster, Development. Springer, pp. 137–150.

Wang, J., Li, Z., 2023. Wind speed interval prediction based on multidimensional time series of Convolutional Neural Networks. Eng. Appl. Artif. Intell. 121.

Wang, S., Fang, G., Liu, L., Wang, J., Zhu, K., Melo, S.N., 2023. Transformer-Based Visual Object Tracking with Global Feature Enhancement. Appl. Sci. 13.

Wu, J., Han, B., Zhang, Y., Huang, C., Qiu, S., Feng, W., Liu, Z., Zou, C., 2025. Enhancing Bolt Object Detection via AIGC-Driven Data Augmentation for Automated Construction Inspection. Buildings 15.

Yadav, D.P., Sharma, B., Chauhan, S., Dhaou, I.B., 2024. Bridging Convolutional Neural Networks and Transformers for Efficient Crack Detection in Concrete Building Structures. Sensors 24.

Yu, D., Wan, B., Sheng, Q., 2024. Automated Generation of Urban Spatial Structures Based on Stable Diffusion and CoAtNet Models. Buildings 14.

Zaidi, S.F.A., Yang, J., Abbas, M.S., Hussain, R., Lee, D. and Park, C. (2024) 'Vision-based construction safety monitoring utilising temporal analysis to reduce false alarms', Buildings, 14(6), 1878. https://doi.org/10.3390/buildings14061878

Zhang, L., Hou, Y., Ren, F., 2025. AIR Agent—A GPT-Based Subway Construction Accident Investigation Report Analysis Chatbot. Buildings 15.

Zhao, H., Sun, J., Wang, X., Wang, Y., Su, Y., Wang, J., Wang, L., 2025. Real-time and high-accuracy defect monitoring for 3D concrete printing using transformer networks. Autom. Constr. 170.

Zhou, Y., Leng, H., Meng, S., Wu, H., Zhang, Z., 2024. StructDiffusion: End-to-end intelligent shear wall structure layout generation and analysis using diffusion model. Eng. Struct. 309.