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Exploring Construction Management Education in the Philippines: A Scientometric Investigation on the Impact of Industry-Academia Collaboration

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Abstract

This study examines the structure and recent evolution of construction management education (CME) research from 2020 to 2025 through a Scientometric and text-mining approach. It aims to identify publication productivity, institutional participation, distribution across sources and titles, keyword prominence, and latent thematic patterns that define the current CME knowledge landscape. Bibliographic records were retrieved from an indexed scholarly database using construction- and education-related search terms, then screened, cleaned, and normalized to retain relevant metadata, abstracts, keywords, affiliations, and citation counts. Descriptive Scientometric analyses were conducted to determine annual publication trends, leading institutions, and major publication venues, while Latent Dirichlet Allocation (LDA) was applied to the cleaned text corpus to uncover deeper conceptual structures. Results indicate a strong increase in publication output from 2020 to 2024, suggesting that CME research is undergoing a period of growth and consolidation, whereas the lower 2025 count is likely due to partial-year indexing effects. Institutional contributions are moderately concentrated, with a few universities leading output, while dissemination remains distributed across several interdisciplinary journals and proceedings. Keyword and topic-model results show that the field is anchored on the education-management-construction triad and is increasingly shaped by digital platforms, data-driven methods, quality assurance, and project-based learning. Overall, the findings suggest that CME is evolving toward a hybrid competency model that integrates traditional construction management foundations with analytics, technological fluency, and evidence-based decision-making. The study offers useful insights for curriculum innovation, institutional collaboration, and future research directions in construction management education.

Keywords: construction management education; scientometric analysis; text mining; Latent Dirichlet allocation; digital transformation

INTRODUCTION

The rapid development of the construction industry hinges significantly on the continuous improvement of construction management education (CME). As infrastructure projects become increasingly complex and technologically driven, the need for highly skilled professionals has never been more urgent. Education serves as the primary engine for developing these necessary competencies, bridging the gap between theoretical knowledge and practical application. An examination of the current literature reveals a multifaceted educational landscape in which pedagogical practices, industry contexts, inherent challenges, and technological opportunities intersect to shape the future of construction engineering and management.

Currently, the construction industry is characterized by distinct, dynamic demands driven by public policy and educational reforms. For instance, the implementation of nationwide K-12 pre-university education reforms in the Philippines necessitated a rapid, large-scale increase in the construction of high-rise school buildings (Almeida & Oreta, 2020). These unique projects rely heavily on variables such as site constraints, student population, resources, and culture. Such rapidly changing construction situations demand an agile, responsive

educational sector capable of preparing future managers to handle the structural and logistical variables distinct to modern building projects.

To address these evolving industry situations, institutions are adopting innovative educational practices and pedagogical frameworks. In the context of emerging engineering education, traditional approaches are being replaced by Outcome-Based Education (OBE) methodologies to better meet social development needs. Zhou et al., (2024) demonstrated that transitioning the curriculum to a "project + software teaching" model significantly improves students' industry operational skills and innovation capabilities. By aligning course materials with frontier logistics and construction technologies, educators can ensure that graduates are thoroughly prepared for real-world execution.

In conjunction with curriculum innovation, robust quality management and informatization practices have become vital components of effective higher education. The foundation of successful vocational and engineering education relies heavily on a structured classroom teaching quality management system that centers on student achievement and continuous improvement (Tian, 2023). Furthermore, the long-term sustainability of educational management requires strategic investments in informatization. Li et al., (2024) emphasized that infrastructure funding, information resources, and teachers' educational technology competencies serve as crucial mediators in improving instructional management, highlighting that pedagogical success is directly tied to the institution's technological capabilities.

The digital transformation of higher education presents unprecedented opportunities for construction management programs, particularly through online and multimodal learning platforms. The widespread adoption of Massive Open Online Courses (MOOCs) has the potential to reshape learning, though platforms frequently struggle with insufficient course quality control and low completion rates. To seize this digital opportunity, educators can integrate curriculum knowledge maps with multimodal resources to standardize course quality, map complex relationships among knowledge points, and create personalized learning experiences that improve overall student engagement and effectiveness (Guo & Dilan, 2025).

Despite these advancements, significant challenges remain, particularly concerning safety education and risk management training. In practice, the construction industry still frequently suffers from casualties driven by unclear safety responsibilities, inadequate site management, and critically insufficient safety education among workers and managers (Yu & Li, 2021). Furthermore, estimating the probability and potential impacts of risks during the planning stages of high-rise construction projects remains a massive challenge, often complicated by a lack of statistical information and reliable assessment models (Almeida & Oreta, 2020). These persistent real-world hazards underscore a critical gap that construction management curricula must urgently address.

Conversely, there are substantial opportunities to overcome these challenges by embedding systemic frameworks such as Lean engineering and Critical Success Factors (CSFs) into the education pipeline. Lean thinking principles, focused on minimizing waste and creating sustainable, cost-effective solutions [v1.1], are highly applicable to construction, project management, and education, presenting a pathway for addressing global sustainable development goals (Alves et al., 2019). Additionally, empirical research on mixed-use building projects has identified "Training and Education" as one of the top prioritized critical success factors, alongside teamwork, communication, and top management commitment (Amora & Juanzon, 2022).

This makes construction management education exist at a critical, dynamic intersection of evolving industry demands, technological innovation, and pedagogical

reform. While educators and practitioners face significant challenges regarding site safety, risk assessment, and online learning retention, opportunities abound through digital curriculum mapping, outcome-based project teaching, and the integration of lean methodologies. A holistic educational approach that successfully synthesizes these technological tools and industry-aligned frameworks is essential to equipping the next generation of construction managers for an increasingly complex global landscape.

The research problem focuses on the following:

1. What are the publication trends in construction management education research in the Philippines?
2. Which institutions contribute most to construction management education research in the Philippines?
3. Where is construction management education research being published, and what major themes have emerged from recent studies?
4. What research themes dominate construction management education?
5. What future directions should construction management education research pursue?

LITERATURE REVIEW

Construction management and related engineering education literature have increasingly shifted from discipline-specific training toward broader models of global competence, interdisciplinarity, and industry responsiveness. Earlier scholarships already noted that the traditional separation among architects, engineers, surveyors, and construction managers was becoming inadequate in the face of increasingly integrated project environments (Chan et al., 2002). This transition was further intensified by globalization, which required higher education institutions to rethink legacy curricula and align them with changing labor-market demands, technological advances, and the needs of developing economies (Cheah et al., 2005). Recent bibliometric evidence confirms that construction education has matured into a significant international research field concerned with graduate readiness, pedagogical innovation, and institutional adaptation to rapidly changing industry contexts (Aliu & Aigbavboa, 2023).

One of the strongest themes in the literature is the centrality of Building Information Modeling (BIM), not only as a technical topic but as a framework for rethinking curriculum and professional preparation. Rather than being treated as a standalone software skill, BIM is presented as a process-based approach that reflects industry expectations and collaborative workflows. Sacks and Pikas (2013) argue that BIM education should be explicitly aligned with industry competency requirements, while Wang and Leite (2014) emphasize teaching BIM as a process-improvement methodology. This direction is reinforced by vertically integrated BIM curricula that embed digital competencies across multiple levels of undergraduate training, rather than isolating them in a single course (Ghosh et al., 2015). Capstone-level implementations likewise demonstrate that BIM can serve as a platform for knowledge integration, teamwork, and applied problem-solving (Zhang et al., 2017).

A second recurring theme is the growing use of project-based, experiential, and interdisciplinary learning to prepare students for the realities of construction practice. The literature consistently argues that lecture-dominated models are insufficient for cultivating the decision-making, coordination, and collaborative skills required in real-world projects. Project-based BIM instruction has been shown to help students engage in authentic construction planning and execution challenges rather than merely absorb abstract concepts (Leite, 2016). Likewise, interdisciplinary design projects encourage students to navigate information sharing, role negotiation, and integrated problem-solving in

collaborative environments supported by BIM (Jin et al., 2018). Experiential learning frameworks further strengthen this pedagogy by linking hands-on activity with reflection and application, thereby approximating the iterative learning processes required in professional practice (Zhang et al., 2019; Gnaur et al., 2015).

A third dominant theme is the use of immersive and simulation-based environments, especially virtual reality and serious gaming, to address the visualization and cognitive demands of construction and civil engineering education. These approaches address the difficulty students often face in understanding the spatial, temporal, and hazard-related dimensions of project environments using static teaching materials alone. Studies have shown that 3D and virtual reality models can make construction, rehabilitation, and maintenance processes more understandable and engaging (Sampaio et al., 2010). Safety education has benefited from these approaches, as game-based and virtual environments allow students to identify hazards and rehearse responses in interactive settings (Lin et al., 2011). Virtual construction simulators similarly help bridge conceptual learning and procedural judgment by placing students in realistic project scenarios (Nikolic et al., 2011), while subsequent review work shows that VR has growing value for communication and coordination across the architecture, engineering, and construction domain (Wen & Gheisari, 2020).

The literature also foregrounds the expansion of online, blended, and digitally mediated teaching strategies, particularly in relation to technology-enabled construction education and pandemic-related disruption. Even before COVID-19, researchers examined students' responses to BIM learning platforms and the role of digital environments in improving access, usability, and engagement (Suwal & Singh, 2018). Flipped classroom models likewise emerged as promising approaches for promoting active learning in construction education by moving foundational instruction online and reserving class time for application and interaction (Mojtahedi et al., 2020). During and after the pandemic, scholarships became more explicit about the need to preserve authenticity and practical engagement in online construction management teaching despite the reduced availability of site-based and face-to-face learning experiences (Abbasnejad et al., 2024). Across these studies, digital delivery is not treated simply as a convenience but as a challenge for pedagogical redesign.

Another major theme concerns sustainability, circularity, and socially responsive professional formation. Construction education literature increasingly treats sustainability as a core professional competence rather than a peripheral topic. Sustainable construction learning has been advanced through problem-based and service-learning approaches that help students integrate technical, environmental, and social dimensions of decision-making (El-Adaway et al., 2015). Interactive methods, such as serious gaming, have also been used to teach sustainability in more engaging, systems-oriented ways (Dib & Adamo-Villani, 2014). More recent work extends this theme by linking digital technologies to circular economy transitions in the construction sector, suggesting that future graduates must understand not only environmental responsibility but also technology-enabled pathways toward resource efficiency and systems transformation (Rodrigo et al., 2024). This literature positions sustainability as part of the epistemic core of construction education.

A further emerging theme is artificial intelligence, machine learning, and broader digital transformation, which are increasingly visible in engineering and construction scholarships. AI is being framed as a transformative force across infrastructure life cycles, affecting design, planning, monitoring, maintenance, robotics, and data-driven decision support (Bao & Li, 2019). Related work in engineering fields such as earthquake engineering demonstrates how machine learning is reshaping methodological practice by enabling the analysis of complex systems and large-scale data (Xie et al., 2020). Bibliometric and topic-modeling studies also

show that digital transformation is influencing the broader evolution of engineering knowledge production and innovation priorities (Lee et al., 2021). Although pedagogical integration remains uneven, the literature suggests that future-ready construction education must go beyond software literacy and cultivate competence in intelligent systems, data reasoning, and digitally enabled professional judgment.

Alongside technological modernization, the literature also emphasizes safety, professional responsibility, and workforce inclusion. Toole (2005) argues that engineers should assume a more active role in construction safety, yet identifies barriers such as limited safety knowledge, weak process awareness, and structural constraints in practice. Educational responses to this challenge include interactive and immersive safety training environments that allow learners to recognize and respond to hazards more effectively (Lin et al., 2011). At the same time, equity and workforce sustainability appear as important concerns, especially in discussions of women's underrepresentation in construction and the need to address cultural and institutional barriers to broaden participation in the profession (Menches & Abraham, 2007). These studies show that high-quality construction education must prepare graduates who are not only technically competent but also ethically aware, safety-oriented, and able to contribute to a more inclusive professional environment.

From the Philippine lens, the uploaded corpus suggests that the local literature remains relatively limited and fragmented compared with the depth of international scholarship. Within this dataset, Philippine-linked materials appear more visible in conference-oriented work on digital platforms, education management, intelligent systems, and project-plus-software instructional models than in a sustained local body of empirical construction management education research (Xu et al., 2021; Yu, 2021; Wen, 2023; Zhou et al., 2024). This is a meaningful finding, because it highlights a local research gap rather than a mature thematic tradition. In the Philippine context, there is clear room for Q1-oriented research that localizes dominant international themes, BIM competency development, immersive and project-based learning, safety pedagogy, sustainability integration, and AI readiness, within Philippine higher education institutions, local industry practices, and labor-market realities. Such work would not only respond to international scholarly conversations but also help define a more context-sensitive and evidence-based national agenda for construction management education.

METHODS

This study used Scientometric and text-mining methods to map the structure and recent evolution of construction management education (CME) research in a corpus covering 2020–2025. The design was selected to quantify publication productivity and impact patterns while also extracting thematic signals from author keywords and abstracts, consistent with the paper's focus on CME as a convergence of education, management practice, and technology-enabled learning.

Bibliographic records were retrieved from a single indexed scholarly database with stable metadata and citation fields (e.g., Scopus) using a structured query applied to titles, abstracts, and keywords. The search combined construction-domain terms (such as construction management, construction engineering, and construction project management) with education-domain terms (such as education, curriculum, teaching, learning, training, and outcome-based education) and was restricted to publications dated 2020 through 2025. Where the dataset definition required a Philippine orientation, records were further constrained using affiliation-country filtering and/or a Philippines term condition in the searchable fields, depending on whether the intent was to capture Philippine-authored CME outputs or CME studies explicitly centered on the Philippine context.

After retrieval, the corpus was screened to retain only CME-relevant documents and to remove duplicates and records lacking essential fields needed for analysis. The retained dataset preserved publication year, document type, source title, author and affiliation metadata, author keywords, abstract text, and citation count at the time of export. Prior to analysis, affiliation names were harmonized to reduce fragmentation caused by spelling variants and abbreviations, and keywords were normalized through lowercasing and synonym merging while protecting domain-specific phrases that carry CME meaning (e.g., outcome-based education, project-based learning, critical success factors).

Descriptive Scientometric analyses were then performed to produce the annual publication trend, identify leading institutions by publication count, and determine the most productive source titles. Citation totals were computed at the source level to contrast volume-driven outlets with those associated with higher visibility, and where appropriate, citations-per-paper were derived to reduce bias from outlet size. Keyword frequency patterns were generated from normalized author keywords and/or key terms from abstracts and visualized to provide a high-level view of CME's conceptual emphasis, particularly the clustering of education and curriculum terms with management and emerging digital/analytics signals.

To extract latent themes beyond surface-level keyword counts, the cleaned text corpus (abstracts with optional keyword integration) was modeled using Latent Dirichlet Allocation (LDA). A document–term matrix was constructed from token counts after standard preprocessing (tokenization, stopword removal, punctuation/number filtering, lemmatization, and optional phrase detection for multiword CME concepts), and multiple topic models were evaluated to optimize coherence and interpretability. The final topic set was selected using topic coherence metrics and expert-informed validation, with topics labeled through the top words and representative documents per topic to yield coherent thematic strands aligned with construction management education practice and pedagogy.

RESULTS

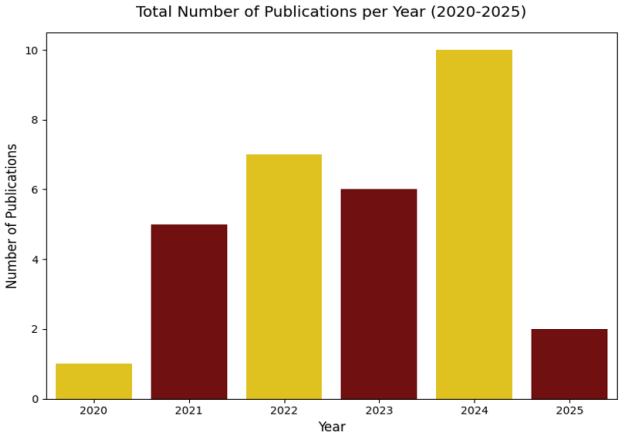

Figure 1
The Status of Construction Management Education in the Philippines

The figure shows a clear upward trajectory in publication output from 2020 to 2024. Production begins at a very low baseline in 2020 (1 publication), then rises sharply in 2021 (5) and continues increasing in 2022 (7). A slight decrease is observed in 2023 (6), followed by a peak in 2024 (10). In 2025, the number of publications is 2.

Institution	Publication Count	Major Author Keywords
University of the Cordilleras	5	College Students' Network Behavior, Random Forest Algorithm, Stacking Machine Learning
José Rizal University	3	Artificial Intelligence, Big data, C4.5 decision tree
Philippine Christian University	3	Course teaching, Emerging engineering education, OBE concept
University of the Philippines	3	Fisheries, Identity, Migration
Angeles University Foundation	2	artificial intelligence technology, Knowledge map, MOOC
De La Salle University	2	Dirichlet distribution, disaster, Leontief model
Nueva Ecija University of Science and Technology (NEUST)	2	Artificial intelligence, Business intelligence, Construction

Figure 2
Institutions with the most research on construction management education.

The figure shows the distribution of institutional contributions. The University of the Cordilleras has the highest output with 5 publications. José Rizal University, Philippine Christian University, and the University of the Philippines each have 3 publications. Angeles University Foundation, De La Salle University, and Nueva Ecija University of Science and Technology each have 2 publications.

The keyword column includes terms such as machine learning, Random Forest, stacking, artificial intelligence, big data, C4.5 decision

tree, student network behavior, engineering education, outcome-based education, MOOCs, disaster modeling, Dirichlet distribution, Leontief model, business intelligence, and construction.

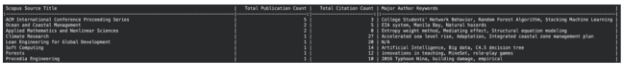

Figure 3

Scopus Source and Major Author Themes in Construction Management Education Research.

The figure presents the distribution of publications across source titles, including journals and conference proceedings, along with their corresponding publication counts and citation counts.

The data shows that publications are distributed across multiple venues. Each source varies in terms of the number of publications and citations received.

The major author keywords associated with each source include terms related to learning, education, analytics, decision models, and technology enabled systems.

Figure 4

Major Research Themes in Construction Management Education

The word cloud shows the most dominant terms in the dataset, including Education, Management, Development, Philippines, Students, College, Curriculum, Teaching, Learning, Educational, Big Data, Information, Intelligent, System, Network, and Innovation.

These keywords represent the primary concepts present in construction management education research within the dataset.

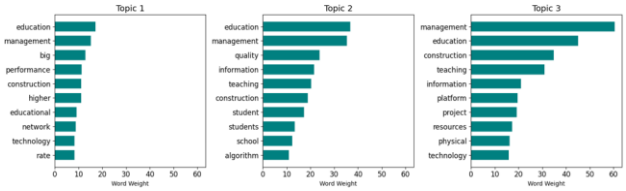

Figure 5

Future Directions of Construction Management Education Research

The LDA topic model identifies three thematic clusters in the dataset:

Topic 1: Education, Management, Big, Performance, Rate, Network, Technology
Topic 2: Quality, Teaching, Information, Student, School, Algorithm
Topic 3: Project, Resources, Platform, Physical, Construction, Technology

These topics represent the recurring themes in construction management education research from 2020 to 2025.

DISCUSSION

The Status of Construction Management Education in the Philippines. The observed increase in publication output from 2020 to 2024 provides clear evidence that construction management education research in the Philippines is undergoing a phase of accelerated growth. The progression from a minimal baseline in 2020 to a peak in 2024 suggests not only increasing academic interest but also a gradual consolidation of the field as a recognized area of inquiry. However, while this upward trajectory reflects expanding research activity, it should not be interpreted as a direct indicator of research maturity. Growth in volume does not necessarily correspond to depth, methodological rigor, or sustained scholarly impact, which remain critical considerations in assessing the true development of the field.

The decline recorded in 2025 requires careful interpretation, as it is likely influenced by partial-year data and indexing delays rather than an actual reduction in research productivity. This limitation highlights a common issue in bibliometric analyses, where

recent outputs are systematically underrepresented. More importantly, the peak observed in 2024 signals a moment of strong research momentum, but sustaining this trajectory will depend on structural factors such as consistent funding support, stable research collaborations, and the ability of researchers to transition outputs from conference proceedings to higher-impact journal publications. Without these enabling conditions, the observed growth may remain episodic rather than sustained. Therefore, while the findings confirm that research activity is increasing, continued monitoring and deeper evaluation of research quality and impact are necessary to determine whether this growth translates into long-term advancement of construction management education in the Philippine context.

Institutions with the Most Number of Research on Construction Management Education. The institutional distribution reveals a moderately concentrated research structure, where a limited number of universities account for a significant portion of the output. This pattern suggests that research capacity in construction management education is not yet widely diffused across institutions in the Philippines. Instead, it appears to be anchored in a small group of universities with relatively stronger research pipelines, which may reflect differences in faculty expertise, access to funding, or institutional research priorities. While such concentration can help establish early leadership in the field, it also raises concerns regarding inclusivity and the long-term sustainability of research development if broader institutional participation remains limited.

At the same time, the convergence of methodological approaches, particularly the prominence of data driven and machine learning techniques, indicates a shared research orientation across institutions. However, this methodological alignment is not matched by thematic coherence, as applications remain widely dispersed across different domains. This suggests that while institutions are adopting similar analytical tools, they are not yet converging toward a unified research agenda. As a result, the field risks fragmentation, where outputs remain isolated rather than contributing to cumulative knowledge building. Strengthening inter institutional collaboration, developing shared research frameworks, and consolidating thematic priorities could enhance both the coherence and impact of construction management education research.

The distribution of publications across multiple journals and conference proceedings indicates that construction management education research operates within a highly interdisciplinary publication landscape. While this diversity allows for broader dissemination, it also reflects the absence of a clearly defined core outlet for the field. Such fragmentation can limit the visibility and cumulative impact of research, as studies are dispersed across platforms with varying audiences, standards, and citation potentials. This lack of concentration may hinder the development of a cohesive scholarly identity for construction management education as a distinct research domain.

Furthermore, the divergence between publication volume and citation performance highlights disparities in research influence across sources. Some outlets appear to generate higher visibility despite lower output, suggesting that strategic journal selection plays a critical role in maximizing impact. The coexistence of methodological and application-oriented keywords also indicates that publication venues may prioritize different types of contributions, with some emphasizing analytical innovation and others focusing on applied educational insights. This variability underscores the need for more deliberate publication strategies, including targeting high impact journals and standardizing keyword usage, to improve indexing, discoverability, and scholarly recognition.

Major Research Themes in Construction Management Education. The most dominant

terms, which are Education, Management, Development, Philippines, and Students, suggest that scholarship is less about purely technical construction methods and more about how construction management capability is built through higher education and training in the Philippine context. The prominence of College, Curriculum, Teaching, Learning, and Educational points to a strong curriculum-and-pedagogy agenda: studies likely examine what should be taught (competency standards, learning outcomes), how it should be taught (course design, delivery modes), and how programs align with workforce needs and outcomes-based education (OBE) directions.

At the same time, the visibility of Big Data, Information, Intelligent, System, Network, and Innovation indicate a parallel track that pushes construction management education toward digital transformation. This suggests growing attention to data-driven decision-making (e.g., analytics for planning, risk, productivity, or resource management) and "smart" construction themes that can be integrated into coursework and capstone projects. In practical terms, the field appears to be converging on a profile of the future construction manager as a hybrid professional: grounded in management fundamentals (planning, risk, resources) while increasingly expected to be fluent in digital tools and analytics.

A defensible implication for program development is to strengthen (1) industry-aligned curricular mapping (competencies → courses → assessments), and (2) applied analytics learning experiences (case-based projects using construction datasets, dashboards, or decision-support exercises), so that education research translates into more employable, innovation-ready graduates.

Future Directions of Construction Management Education Research. The LDA topic model suggests that construction management education (2020–2025) in your dataset clusters around three recurring thematic "pillars," all anchored on the tight coupling of education–management–construction across topics.

Topic 1 is best read as a performance-and-technology strand: alongside "education" and "management," the presence of big, performance, rate, network, and technology implies an emphasis on measurement—how programs, learners, or construction-related competencies are assessed and improved using data-driven or technology-mediated approaches (e.g., learning analytics, benchmarking, or performance evaluation tied to construction management outcomes).

Topic 2 looks like a quality assurance and pedagogy strand. Here, quality, teaching, information, student/students, school, and algorithm appear with education and management, pointing to studies concerned with instructional design and academic quality (often aligned with OBE-style thinking): what teaching strategies work, how information systems support delivery and assessment, and how "algorithmic" or AI-informed approaches may be used to evaluate learning patterns or improve decision-making in educational settings.

Topic 3 aligns most directly with the practice-facing core of construction management education: project, resources, platform, physical, and technology sit beside management, education, construction, and teaching. This reads like curriculum work that foregrounds project-based learning and the realities of construction operations, resource planning, project execution, and the "physical" nature of the built environment [v1.1], while increasingly relying on platforms and tools. Taken together, the three topics imply a coherent direction for construction management programs: strengthen (1) performance/metrics and analytics, (2) quality teaching and student-centered assessment supported by information systems, and (3) project- and resource-intensive experiential learning delivered through modern digital platforms.

Conclusion. The findings indicate that construction management education (CME) research in the 2020–2025 corpus is in a

growth-and-consolidation phase, with publication output accelerating toward 2024 and a multi-institutional contributor landscape led by a small set of higher-producing universities. Across venues, dissemination is spread across several source titles, suggesting an interdisciplinary audience rather than a single "home" outlet. The intellectual structure of the field is consistently anchored on the education–management–construction triad, while the keyword and topic-model results show a strong methodological tilt toward data-driven and technology-enabled approaches. In particular, the thematic patterns converge on three programmatic directions: (1) performance and analytics-oriented education research (e.g., big data, network/technology signals), (2) pedagogy and quality assurance concerns (teaching, quality, students, information), and (3) practice-facing, project-and-resource-centered learning supported by platforms and tools. Overall, CME scholarship appears to be evolving toward a hybrid competency model where construction managers are trained not only in classical project controls and resource planning, but also in digital fluency and evidence-based decision-making.

Recommendation. Based on these results, future CME work should prioritize curriculum development and research that directly builds a coherent, industry-aligned skills pipeline while improving scholarly impact and policy relevance. Programs may strengthen outcome-based curricular mapping by explicitly linking competencies (e.g., project planning, risk/safety, cost, sustainability, ethics) to authentic assessments such as project-based studios, site-data case analyses, and capstone problems co-designed with industry partners. To respond to the field's digital turn, institutions should embed applied analytics and platform-based learning across the curriculum, including training in construction informatics, dashboards, simulation, and responsible AI use, supported by shared datasets and replicable teaching modules. At the research level, greater standardization of keywords and clearer positioning of studies within CME sub-themes can improve indexing visibility, while cross-institution collaboration clusters can consolidate expertise and reduce fragmentation. Finally, periodic updating of the dataset and the inclusion of additional bibliographic sources can validate whether the 2025 decline reflects indexing lag or a real output change and can help monitor whether CME research is translating into measurable outcomes such as improved licensure/employability indicators, safer site practices, and more innovation-ready graduates.

Author contributions. Jethro Jhames A. Jose: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Resources, Software, Writing – original draft, Writing – review & editing | Arvin Dela Cruz: Supervision, Validation.

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Data availability statement. The dataset will be available upon request from the corresponding author of this study.

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