Unveiling Research Trends in Construction Front-End Planning: A Bibliometric Analysis

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Abstract
Front-end planning (FEP) is essential for construction project success, yet its research remains fragmented. This study provides a comprehensive bibliometric analysis of FEP research in construction project management from 2010 to 2024. Using the PRISMA framework and Scopus-indexed publications, the study examines publication trends, key contributors, prolific journals, institutional affiliations, and dominant research themes. The findings reveal fluctuations in research activity, with a significant rise in publications in recent years, indicating growing academic interest in FEP. The study identifies the most influential journals and authors. The United States, China, and the United Kingdom lead in research output, yet imbalances exist between high-publication venues and high-impact studies. Additionally, keyword analysis underscores conceptual inconsistencies of FEP, with terms such as feasibility study, pre-project planning, and front-end engineering design. Despite its growing recognition, FEP in construction remains fragmented, with varying interpretations and limited standardization. The study highlights the need for more empirical research to enhance and standardize the theoretical and practical understanding of FEP across different construction contexts.
Keywords: Feasibility Phase, Construction Project Management, Front-End Planning; Early Stage Planning, Scope Definition, Front-End Engineering Design

Introduction
Front-end planning (FEP) plays a pivotal role in construction project success by ensuring a well-defined project scope, structured decision-making, and proactive risk identification (Bingham & Gibson Jr, 2017). It serves as a strategic foundation that aligns project objectives with execution feasibility, mitigating uncertainties and improving overall project performance (Rahat et al., 2023). Prior research has demonstrated the significant impact of FEP tools on capital projects, highlighting their correlation with cost efficiency, schedule adherence, and reduced project modifications (CII, 2012; Merrow, 2011; Rahat et al., 2023). Research by the

Construction Industry Institute (CII) demonstrated that efficient front-end planning can lower design and construction costs by 20%, reduce design and implementation time by 39%, and improve the chances of meeting sustainability goals (Bosfield, 2012; Gibson & Bosfield, 2012). Moreover, the significance of Front-End Planning (FEP) lies in the fact that decisions and activities undertaken during this phase exert a greater influence on project success compared to those made during the execution stage (Hansen et al., 2018). However, despite its acknowledged significance, FEP remains a fragmented concept, characterized by diverse definitions, terminologies, and applications across the construction industry (Babaei et al., 2021; Williams et al., 2019).

The Construction Industry Institute (CII) defines FEP as a structured, stage-gated process that supports informed decision-making by evaluating risks and opportunities before advancing to detailed planning and execution (CII, 2012). Nevertheless, its adoption and implementation remain inconsistent, influenced by regional, organizational, and industry-specific factors (Hansen et al., 2018). The lack of standardization in FEP practices has led to persistent challenges in scope definition, stakeholder alignment, and risk assessment (Babaei et al., 2021; Hansen et al., 2018; Williams et al., 2019). Studies have shown that inadequate front-end planning contributes significantly to project underperformance, including cost overruns, schedule delays, and operational inefficiencies (Jatarona, 2018; Kog, 2019; Ramli et al., 2018). Weak FEP adoption has been linked to ineffective governance, insufficient early-stage project assessment, and an overreliance on traditional, cost-driven planning approaches (Aghimien et al., 2018). Furthermore, differing perspectives on FEP's role in project management create further complexities. While some scholars view FEP as an integral part of project management requiring strategic expertise, others argue that a project only formally begins after completing the front-end phase (Babaei et al., 2021; Morris, 2016).

Given the increasing recognition of FEP's impact on project success, a growing body of research has explored its processes, methodologies, and challenges. However, existing studies often lack a holistic view of FEP's development, key contributors, and evolving research trends. This study addresses this gap by conducting a bibliometric analysis of FEP research from 2010 to 2024, mapping its intellectual structure, and identifying dominant themes, prolific authors, leading institutions, and publication trends. By analyzing Scopus-indexed literature using the PRISMA framework, this study aims to provide a systematic understanding of how FEP research has evolved, highlighting key areas for future exploration and potential standardization efforts in construction project management.

Method and Materials
Research Design
This study employed a bibliometric analysis aimed at systematically investigating the research on front-end planning (FEP) in construction project management over the past 15 years (2010–2024). The use of bibliometric techniques enables a comprehensive and systematic analysis of the existing literature, offering deeper insights beyond the limitations of traditional manual reviews (Donthu et al., 2021). The objectives of this study are to analyse publication trends, including key journals and prolific authors, the most influential countries and institutions, and map dominant research themes related to FEP. The study adopted the PRISMA framework to ensure a structured and transparent approach to data collection and screening (Page et al., 2021).

Identification

Database Selection

This study utilizes Scopus as the primary database for data collection, with the search conducted on February 19, 2025. Scopus database was chosen for its extensive indexing of high-quality, peer-reviewed literature across disciplines relevant to construction project management (Adebowale & Agumba, 2023; Aghimien et al., 2020). Its efficient indexing surpasses databases like Web of Science and Google Scholar, making it a preferred choice for academic research (Ametepey et al., 2024). Additionally, its advanced search capabilities allow for precise filtering based on keywords, subject areas, and document types, ensuring a comprehensive and systematic bibliometric analysis. With detailed citation tracking and analytical tools, Scopus facilitates a structured examination of research trends (Ametepey et al., 2024).

Search String

The search string for this study was designed to ensure a holistic and systematic retrieval of literature on front-end planning (FEP) in construction project management. The query targeted title, abstract, and keyword fields in Scopus, using a combination of Boolean operators and keyword variations to maximize relevant results. The search included a broad range of synonyms and related terms for front-end planning identified from the literature. For instance, TITLE-ABS-KEY ("Front-End Planning" OR "Front-End Loading" OR "Front-End Engineering and Design" OR "Pre-Project Planning" OR "Early Project Planning" OR "Exploratory Phase" OR "Conceptual Planning" OR "Pre-Construction Planning" OR "Strategic Definition" OR "Project Definition Phase" OR "Preliminary Stage" OR "Initiation Phase" OR "Feasibility Study" OR "Concept Phase" OR "Feasibility Phase" OR "Detailed Scope Phase" OR "Pre-Contract Planning" OR "Early Stage Planning" OR "Preliminary Design" OR "Concept Design"). Additionally, construction-related terms were included. For instance, TITLE-ABS-KEY ("Construction Projects" OR "Infrastructure Projects" OR "Mega Projects" OR "Capital Projects" OR "Large-Scale Projects" OR "Complex Projects" OR "Engineering Projects" OR "Industrial Projects" OR "Public Sector Projects" OR "Private Sector Projects" OR "Urban Development" OR "Housing Projects"). Moreover, to refine the results, several filters were applied. The publication year was restricted to 2010–2024. For instance, AND PUBYEAR > 2009 AND PUBYEAR < 2025. In addition, the search was limited to engineering, environmental science, social sciences, decision sciences, and business. For instance, LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "DECI") OR LIMIT-TO (SUBJAREA , "BUSI"). Then, the search was further refined to cover only journal articles and conference papers. For instance, AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp")). Finally, the language was limited to English-only publications. For instance, LIMIT-TO (LANGUAGE , "English").

Inclusion and Exclusion Criteria

To ensure the selection of relevant studies on front-end planning (FEP) in construction, specific inclusion and exclusion criteria were applied in this bibliometric analysis, as outlined in **Table 1**. Studies were included if they contained FEP and construction-related keywords in the title, abstract, or keywords section. The publication period was restricted to 2010–2024, excluding older studies. The analysis focused on subjects relevant to FEP, including Engineering, Environmental Science, Social Sciences, Decision Sciences, and Business, while studies from unrelated fields were excluded. Furthermore, only peer-reviewed journal articles

and conference papers were considered. Lastly, to maintain consistency and accessibility, only English-language publications were included. **Table 1** provides a detailed overview of these criteria, ensuring a structured and comprehensive selection process for the study.

Table 1
Inclusion and Exclusion Criteria

Criteria	Inclusion Criteria	Exclusion Criteria
Keywords	Studies including front-end planning and construction-related keywords in Title, Abstract, or Keywords.	Studies not containing relevant keywords related to front-end planning or construction.
Publication Year	Studies published between 2010 and 2024.	Studies published before 2010.
Subject Areas	Studies in Engineering, Environmental Science, Social Sciences, Decision Sciences, or Business.	Studies outside the specified subject areas, such as medical or pure sciences.
Document Type	Journal articles and conference papers.	Book chapters, editorials, reports, and other non-peer-reviewed sources.
Language	English language publications only.	Publications in languages other than English.

Screening and Selection
The screening and selection process adopted a systematic approach to ensure the inclusion of relevant research on front-end planning in construction project management. The search was conducted using the Scopus database, which initially identified 1,205 studies. After applying the inclusion and exclusion criteria, as shown in Table 1, 579 publications were excluded. Following this eligibility assessment, a final set of 626 studies was selected for bibliometric analysis, ensuring a rigorous and structured approach to literature selection.

Inclusion and Reporting
The PRISMA framework (see Figure 1) was employed to systematically to report the findings for this bibliometric study, ensuring a transparent, structured, and reproducible reporting process (Page et al., 2021). By adhering to PRISMA, the study provides a well-documented and rigorous selection methodology, enhancing its credibility and replicability (Page et al., 2021). Accordingly, the following section will further elaborate on the study's research questions and key findings.
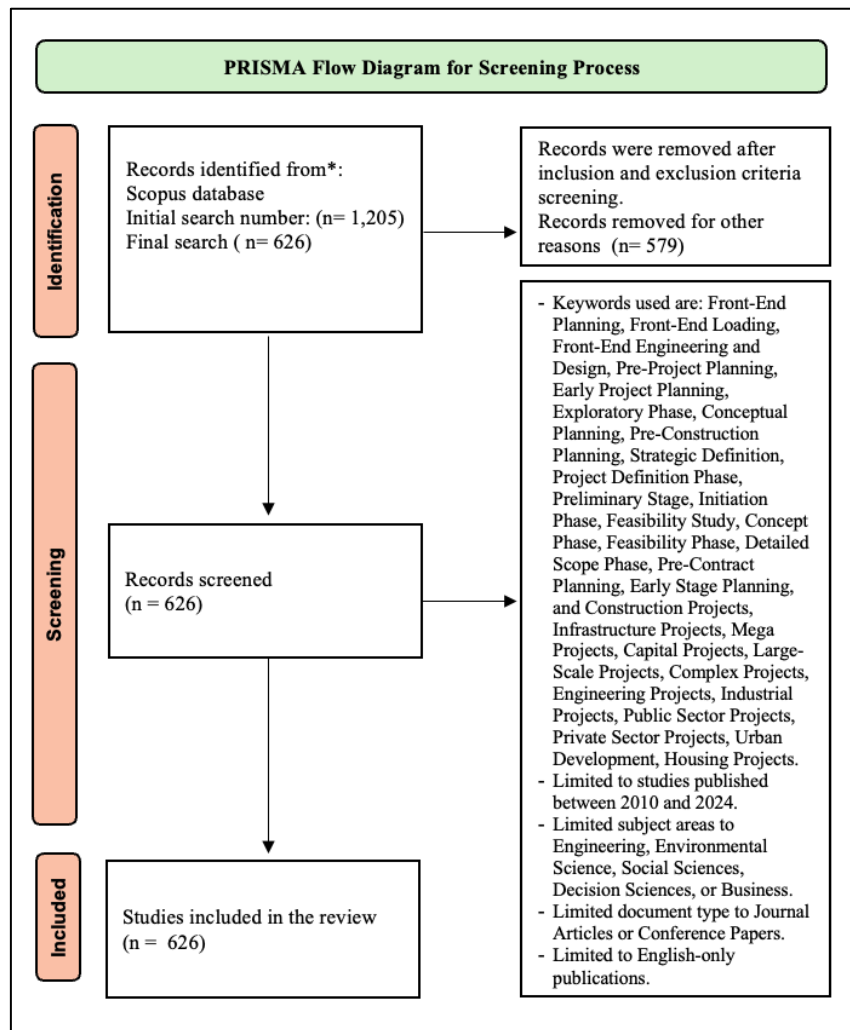
Figure 1: PRISMA framework for the study

Research Questions

1- What is the distribution of construction front-end planning publications from 2010-2024?
2- What are the most relevant journals and authors in construction front-end planning in English language research?
3- What are the most prolific educational institutions in the construction front-end planning research area?
4- What are the primary research keywords for the construction front-end planning research area?

Results

This section presents the findings of the bibliometric analysis, highlighting publication trends, key contributors, and research patterns in front-end planning within construction project management. By addressing the mentioned research questions.

Distribution of the Publications

To examine publication trends, the study analyzed the distribution of articles published from 2010 to 2024, highlighting the research growth and key periods of activity in construction front-end planning. For instance, Figure 2 illustrates the distribution of publications on front-

end planning in construction from 2010 to 2024, revealing fluctuations in research activity over time. The lowest number of publications was recorded in 2010 (15 articles), followed by a gradual increase in the subsequent years, reaching 25 articles in 2011. The numbers remain relatively low between 2012 and 2013, fluctuating between 23 and 33 publications. A notable rise is observed from 2014 to 2016, with publications stabilizing between 33 and 35 articles per year. However, 2017 marks a decline, with only 29 publications, before returning to 52 in 2018. The trend fluctuates again, with 49 publications in 2019 and 59 in 2020. A sharp increase occurred in 2021 (50 articles), followed by 63 in 2022, and 60 in 2023. The highest number of publications (66 articles) was recorded in 2024, indicating a renewed academic interest in construction front-end planning research. This trend suggests growing recognition of front-end planning's significance, despite periodic declines, possibly due to shifts in research focus, industry trends.
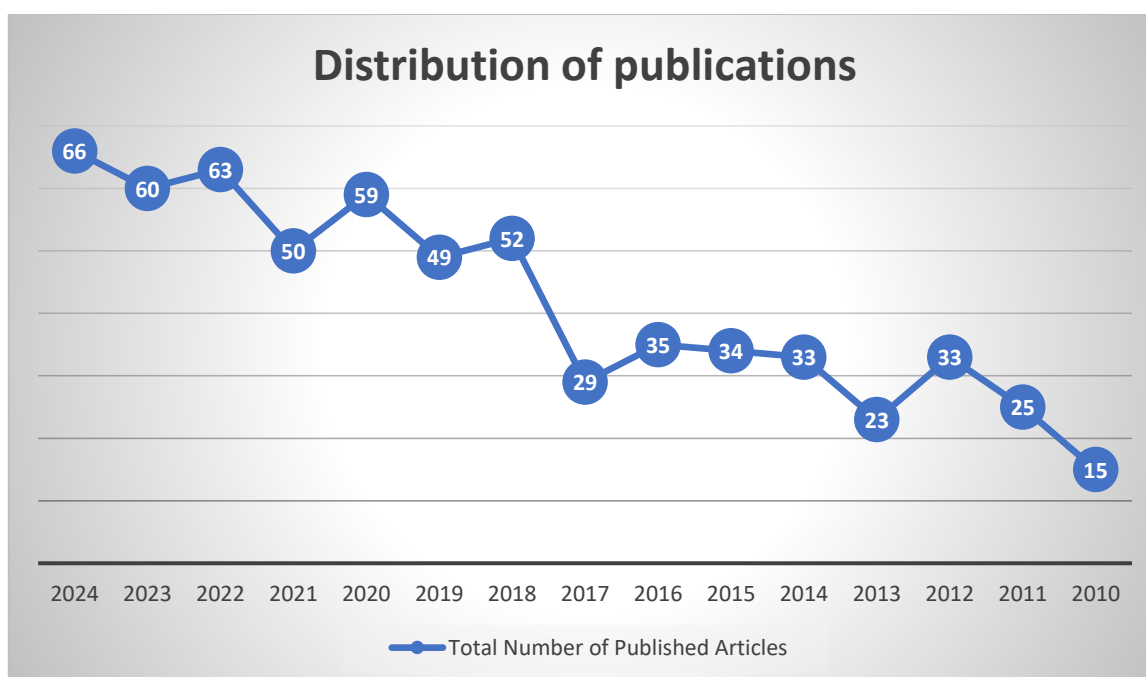

Figure 2: Trend in the Distribution of the Publications (2010–2024)

Furthermore, Figures 3 and 4 illustrate the top 15 countries contributing to the global distribution of 626 publications in construction front-end planning research. Figure 3, a pie chart, shows the United States is the highest contributor with 22% of the total publication in construction front-end planning, followed by China (17%) and the United Kingdom (9%). Other key contributors include Australia (8%), Canada (7%), Malaysia (5%), and India (5%), while several countries contribute less than 5%. Furthermore, Figure 4, a world map, visualizes the geographical spread of these publications, emphasizing the United States, China, and the United Kingdom as leading research hubs, with smaller contributions from South Africa, Poland, South Korea, and Hong Kong. Together, these figures highlight the dominance of major regions while showcasing global participation in front-end planning research.
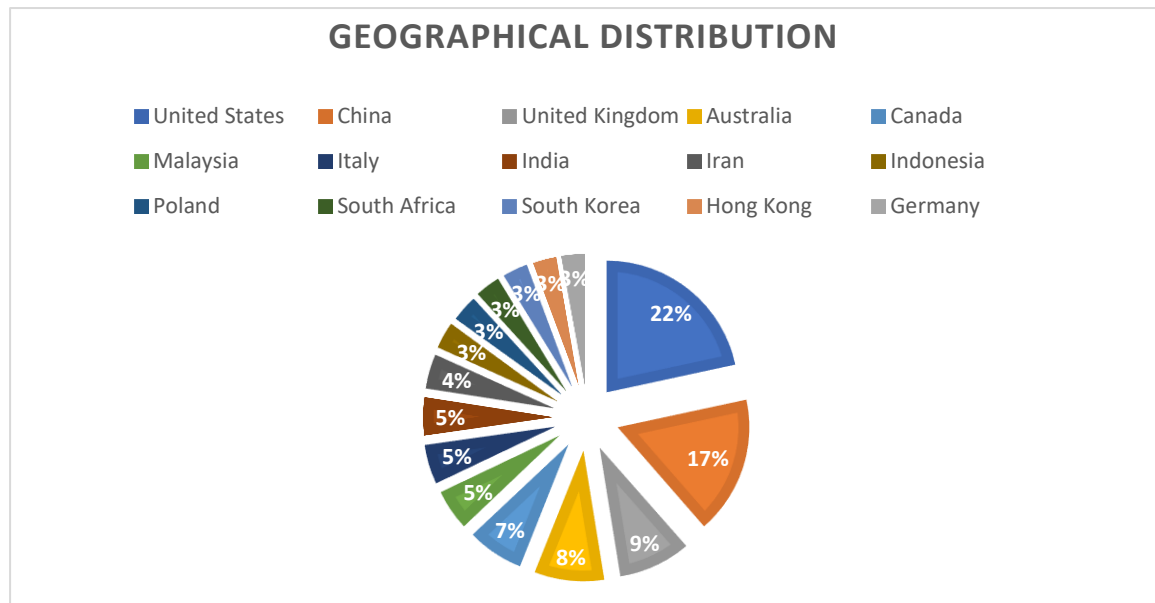
Figure 3: Geographical Distribution of Publications
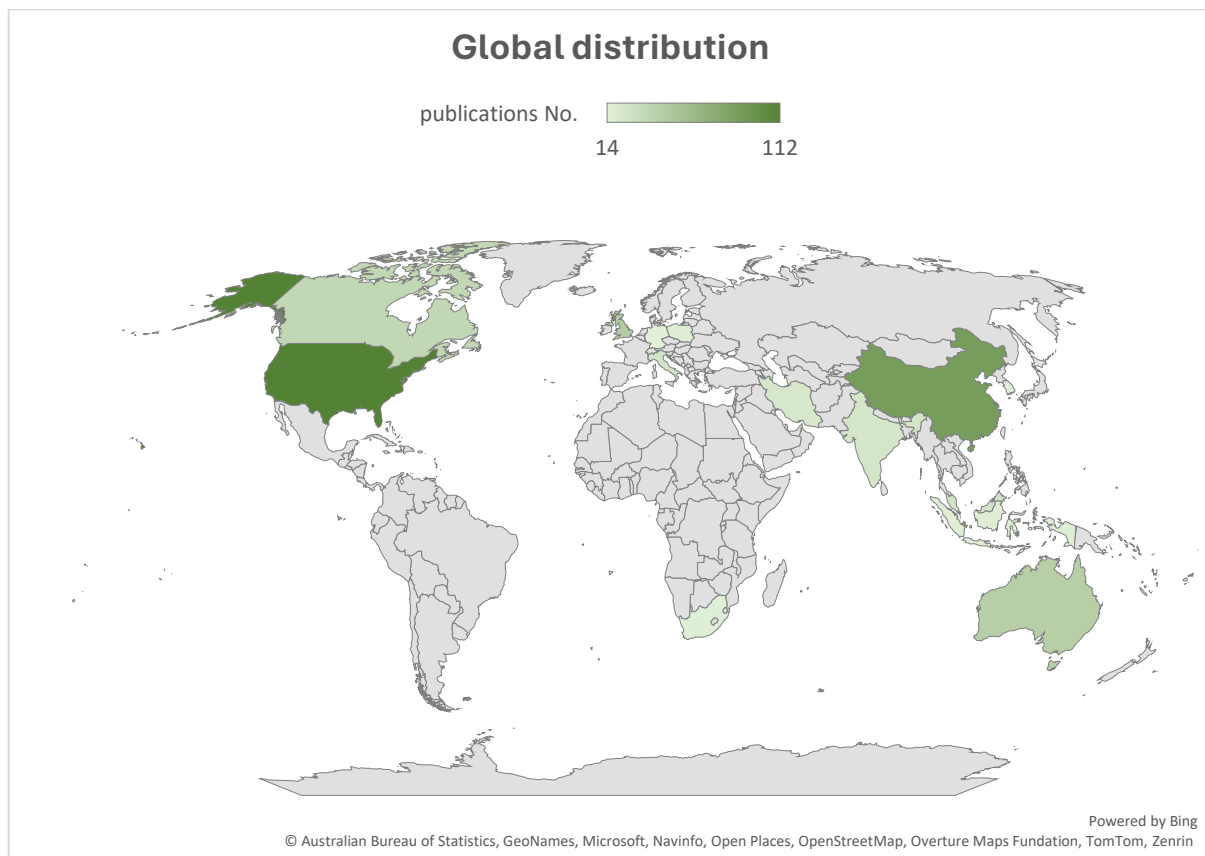
Figure 4: Global distribution of Publications

Most Relevant Journals and Authors

This section highlights the key journals and authors contributing to construction front-end planning research, identifying the leading publication venues and influential scholars shaping the field. For instance, Figure 5 highlights the 12 leading journals sand conference papers in construction front-end planning research. These leading sources contributed by 7 publications and above. Sustainability (Switzerland) has the highest number of publications

(19), followed by the Proceedings of SPIE (11) and the IOP Conference Series: Earth and Environmental Science (10). Among conference papers, the ASEE Annual Conference and Exposition and Procedia Engineering each have 8 publications. The lowest number of publications (7) is recorded by Construction Management and Economics.

Figure 5: Leading Journals and Conferences

To elaborate more, Table 2 presents the most prolific journals in the field of construction front-end planning, after excluding the sources not currently covered under the Scopus index. From the total publications (TP) per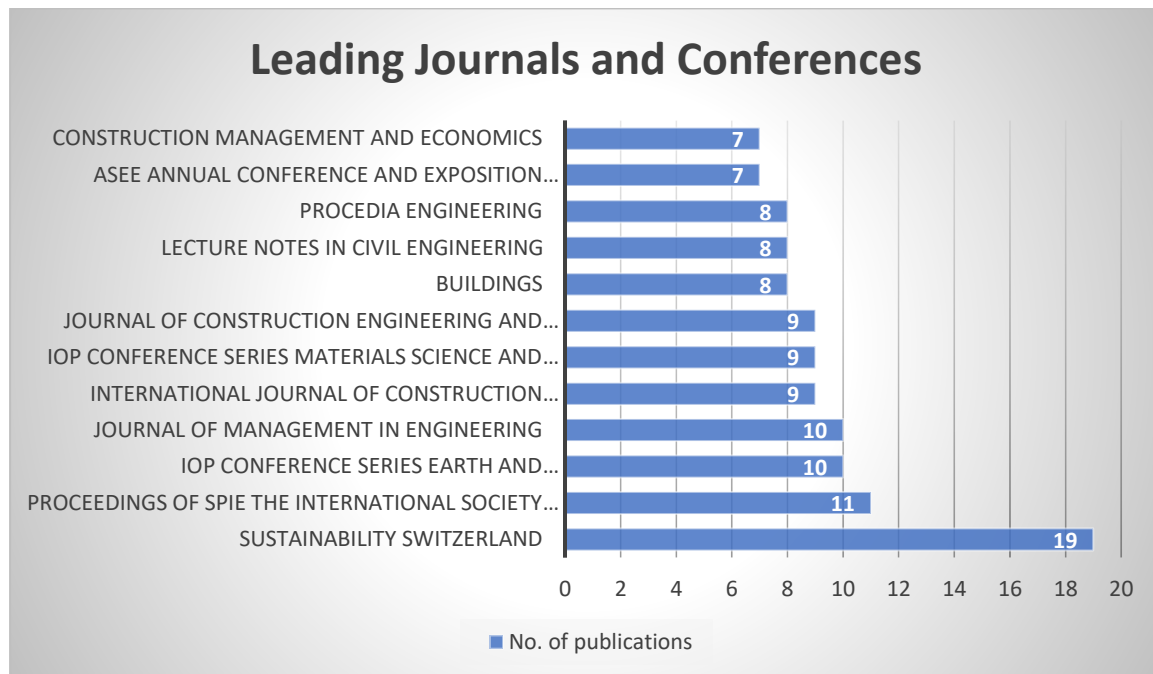spective, the Proceedings of SPIE - The International Society for Optical Engineering has the highest number of publications (TP = 68,820), followed by Sustainability (Switzerland) (TP = 58,396) and IOP Conference Series: Earth and Environmental Science (TP = 55,162). The lowest number of publications is recorded by Construction Management and Economics (TP = 232) and Journal of Management in Engineering (TP = 434). From the total citations (TC) perspective, Sustainability (Switzerland) has the highest count (TC = 439,581), followed by the Journal of Construction Engineering and Management (TC = 75,562) and IOP Conference Series: Earth and Environmental Science (TC = 72,746). The lowest total citations are seen in Construction Management and Economics (TC = 1,751) and Journal of Management in Engineering (TC = 5,461). Regarding citation scores, the Journal of Management in Engineering ranks highest (12.6), followed by the Journal of Construction Engineering and Management (8.7) and the International Journal of Construction Management (8.6). The lowest citation scores are observed in the Proceedings of SPIE (0.5) and Lecture Notes in Civil Engineering (0.8).

Table 2

Most Prolific Journals in the Field of Construction Front-End Planning

Journal	TP	TC	Citation score	Most cited article	Times cited	Publisher
Sustainability (Switzerland)	58,396	439,581	7.5	(Periyasamy, 2024)	77	Multidisciplinary Digital Publishing Institute (MDPI)
Proceedings of SPIE - The International Society for Optical Engineering	68,820	32,499	0.5	(Wielgus27 & Wong)	22	SPIE
IOP Conference Series: Earth and Environmental Science	55162	72746	1.3	(William et al., 2024)	14	IOP Publishing Ltd.
Journal of Management in Engineering	434	5461	12.6	(He et al., 2024)	19	American Society of Civil Engineers
International Journal of Construction Management	672	5753	8.6	(Ali et al., 2024)	29	Taylor & Francis
Journal of Construction Engineering and Management	874	75,562	8.7	(Do et al., 2024)	11	American Society of Civil Engineers
Buildings	6,258	21439	3.4	(Nassiraei, 2024)	35	Multidisciplinary Digital Publishing Institute (MDPI)
Lecture Notes in Civil Engineering	17,058	12,939	0.8	(Teizer et al., 2023)	9	Springer Nature
Construction Management and Economics	232	1,751	7.5	(Shahruddin & Husain, 2024)	7	Taylor & Francis
Engineering, Construction and Architectural Management	716	5,771	8.1	(Wang et al., 2022)	36	Emerald

*TP= total publications. *TC= total citation

Moreover, Table 3 presents the most influential authors in construction front-end planning research, ranked based on total publications (TP), total citations (TC), and h-index. In terms of total publications (TP), Sharareh Kermanshachi has the highest number of published articles (237), followed by George E. Gibson (102) and Mohamed ElZomor (83). The lowest

publication counts are recorded by Valentina Ferrer (6), Sungmin Yun (23), and Rubaya Rahat (25). For total citations (TC), Sharareh Kermanshachi has the highest citation count (3,163), followed by George E. Gibson (2,186) and Petra M. Bosch-Sijtsema (1,705). The lowest citation counts belong to Valentina Ferrer (21), Rubaya Rahat (50). Regarding the h-index, which measures both productivity and citation impact, Sharareh Kermanshachi holds the highest value (28), followed by George E. Gibson (25) and Petra M. Bosch-Sijtsema (23). The lowest h-index values are recorded for Valentina Ferrer (3), Rubaya Rahat (4), and Piyush Pradhananga (8).

Table 3
Most influential Authors in Construction Front-End Planning Research

Author	FYP	TP	h-index	TC	Current affiliation	Country
Gibson, George E.	1996	102	25	2,186	Arizona State University.	United States
Kermanshachi, Sharareh Sherri	2013	237	28	3,163	College of Engineering The institution will, Arlington	United States
Parrish, Kristen D.	2007	85	14	744	Ira A. Fulton Schools of Engineering	United States
Pradhananga, Piyush	2020	44	8	256	FIU College of Engineering and Computing	United States
Ferrer, Valentina	2022	6	3	21	FIU College of Engineering and Computing	United States
ElZomor, Mohamed	2016	83	10	375	Florida International University	United States
Safapour, Elnaz	2017	41	12	588	Georgia Southern University	United States
Rahat, Rubaya	2022	25	4	50	FIU College of Engineering and Computing	United States
Yun, Sungmin	2009	23	11	464	Yeungnam University	South Korea
Bosch-Sijtsema, Petra M.	2007	58	23	1,705	Chalmers University of Technology	Sweden

*FYP= First year of publication, *TP= Total publications, *TC= Total citations.

The Most Prolific Educational Institutions in Construction Front-End Planning
The most prolific educational institutions in construction front-end planning research, categorized by total publications (TP) and country, are presented in Table 4. The United States leads research contributions, followed by China, South Africa, Canada, and Sri Lanka. Firstly, the United States has the highest representation, with Arizona State University (27

publications) leading, followed by The University of Texas at Austin (15), Florida International University (9), The University of Texas at Arlington (8), and FIU College of Engineering and Computing (8). Secondly, South Africa's University of Johannesburg (9 publications), China's Hong Kong Polytechnic University, and Tongji University (7 each) also contribute significantly. Lastly, the lowest publication counts are recorded by Canada's University of Waterloo (6 publications) and Sri Lanka's University of Moratuwa (6 publications).

Table 4
Most Prolific Educational Institutions

AFFILIATION	TP	Country
Arizona State University	27	United States
University of Johannesburg	9	South Africa
Florida International University	9	United States
The University of Texas at Arlington	8	United States
FIU College of Engineering and Computing	8	United States
The University of Texas at Austin	15	United States
The Hong Kong Polytechnic University	7	China
Tongji University	7	China
University of Waterloo	6	Canada
University of Moratuwa	6	Sri Lanka

*TC= Total publication

Key Research Keywords in Construction Front-End Planning (2010–2024)
The bibliometric analysis utilized co-occurrence to identify the most frequently used keywords, considering all keywords as the unit of analysis. This method provides insight into the main research themes and highlights the key focus areas in construction front-end planning research . This study identified 287 keywords related to construction front-end planning research, highlighting the dominant themes in the field. Figure 6 presents the most frequently occurring keywords, showcasing the key research focus areas. The most highly recurring keywords include "construction projects" (137 occurrences, 840 total link strength), "project management" (120 occurrences, 794 total link strength), and "feasibility study" (108 occurrences, 745 total link strength). Additionally, keywords such as "feasibility studies" (94 occurrences), "planning" (42 occurrences, 342 total link strength), and "pre-project planning" (14 occurrences, 75 total link strength) emphasize the early-stage decision-making processes in construction projects. Moreover, the bibliometric analysis identified 8 key terms directly related to front-end planning in construction research, totaling over 405 occurrences. The most frequently used keywords include "feasibility study" (108 occurrences), "feasibility studies" (94), "front-end planning" (34), and "preliminary design" (31). Additional relevant terms such as "pre-project planning" (14), "pre-construction planning," "risk assessment" (38), and "cost estimating" (30) emphasize the focus on early-stage decision-making and structured planning.

Figure 6: Most frequently occurring keywords

Discussion

The findings of this bibliometric analysis provide a **comprehensive yet critical overview** of research trends, key contributors, and dominant themes in front-end planning (FEP) within construction project management from **2010 to 2024**. Despite growing recognition of FEP's role in project success, **the concept remains underexplored and inconsistently applied across different regions** (Perrier et al., 2020; Rehan et al., 2024; Williams et al., 2019).

Publication Trends and Geographical Distribution

The fluctuating publication trends in construction front-end planning (FEP) research (2010–2024) highlight inconsistent academic efforts within this area of research. Despite early stagnation, research gained momentum from 2014 to 2016 before experiencing a decline in 2017 (29 publications). A notable resurgence in 2018 (52 publications) was followed by fluctuations, peaking in 2024 (66 publications). This pattern suggests increasing research priorities and focusing more on researching the concept of front-end planning in construction, potentially influenced by industry demands, evolving methodologies, and project performance issues rather than sustained academic commitment. However, the total number of publications in construction front-end planning remains low compared to other areas of construction project management, reinforcing claims that FEP has not yet comprehensively explored (Babaei et al., 2021; Hansen et al., 2018; Perrier et al., 2020; Rehan et al., 2024).

The **geographical distribution of publications** reinforces the dominance of **the United States, China, and the United Kingdom** in FEP research. This trend suggests that **well-established research institutions and industry-driven initiatives** have significantly advanced early-stage planning practices. For instance, in the **United States**, the **Construction Industry Institute (CII)**

has been at the forefront of **developing and standardizing FEP frameworks**, promoting structured methodologies to enhance project outcomes (CII, 2014). Similarly, in the **United Kingdom**, the **Infrastructure and Projects Authority (IPA)** plays a crucial role in guiding front-end planning for **major public infrastructure projects**, ensuring **strategic early-stage decision-making** (Babaei et al., 2021; Hansen et al., 2018; Williams et al., 2019). However, regional disparities persist. For example, South African firms struggle with decision-making inefficiencies (Aghimien et al., 2018), while Omani firms prioritize cost-cutting over structured planning (AlNasseri & Aulin, 2015). These inconsistencies indicate that FEP methodologies are not universally effective and demand localized adaptation to improve implementation and project outcomes. Moreover, these findings emphasize the need to extend the geographical boundaries to study front-end planning from different perspectives and contexts that might offer new opportunities and challenges.

Journals, Conferences, and Citation Impact
The growing academic engagement with the front-end planning (FEP) concept is evident in high-volume journals like Sustainability (Switzerland) and high-impact sources such as the Journal of Management in Engineering. However, the analysis reveals an imbalance in front-end planning (FEP) research dissemination, with high-volume journals like Sustainability (Switzerland) dominating publication counts but lacking the citation impact of more specialized, high-influence journals such as the Journal of Management in Engineering (citation score: 12.6). Similarly, while conferences like the ASEE Annual Conference and Procedia Engineering facilitate rapid knowledge exchange, their lower citation impact suggests limited long-term influence. The disparity between publication volume and research impact is evident, as sheer output does not guarantee influence. Sustainability (Switzerland), despite leading in citations, has a moderate citation score (7.5), whereas journals with fewer publications, like the Journal of Construction Engineering and Management, exhibit higher per-article impact. This highlights the challenge of fragmentation in FEP research, where quantity-driven outputs dilute theoretical advancements. To enhance FEP's academic and industry relevance, there is a need for greater consolidation in publication channels, prioritizing rigorous, high-impact research over volume-focused contributions. Strengthening quality-driven publishing will ensure FEP studies contribute more effectively to construction project planning methodologies.

Authorship and Institutional Contributions
The analysis of authorship and institutional contributions highlights key players driving construction FEP research. Scholars like Sharareh Kermanshachi, George E. Gibson, and Mohamed ElZomor lead in publication volume and citation influence, shaping theoretical and practical advancements in FEP. Their contributions underscore the role of dedicated researchers in expanding the field. Institutionally, Arizona State University, the University of Texas at Austin, and Florida International University emerge as leading research hubs. Their high publication output reflects strong academic engagement in FEP. However, contributions remain concentrated in a few regions, with limited representation from emerging economies. Expanding institutional collaboration and diversifying authorship could strengthen global FEP research, fostering broader innovation and industry adoption and standardizing the concept of FEP in construction project management.

Key Research Themes and Keywords
The analysis of key research themes in front-end planning (FEP) highlights dominant focus areas shaping the field. The most frequently occurring keywords, such as "feasibility study," "preliminary design," "front-end planning," and "pre-project planning," emphasize the significance of structured early-stage decision-making in construction. Additionally, themes like "cost estimating," "risk assessment," and "planning" reflect the industry's emphasis on reducing uncertainties and improving project feasibility.

Despite the increasing recognition of FEP, research in the field remains fragmented, with inconsistencies in terminology and interpretation across studies. Various concepts, including front-end loading (FEL), feasibility analysis, pre-project planning (PPP), front-end engineering design (FEED), early project planning, conceptual planning, and, have been used interchangeably to describe FEP (George et al., 2008; Gibson Jr et al., 2006). Thus, establishing clearer conceptual definitions and aligning research themes could enhance the practical application of FEP across different construction contexts.

Contributions of the Study
This study makes significant contributions to both theoretical understanding and practical applications of front-end planning (FEP) in construction project management. Theoretically, it maps the evolution of FEP research (2010–2024), highlighting key contributors, dominant themes, and terminological inconsistencies that create fragmentation in the field. By addressing the interchangeable use of terms like front-end loading (FEL), pre-project planning (PPP), and front-end engineering design (FEED), this study emphasizes the need for a unified theoretical framework. Additionally, it explores the construction front planning, an area often overlooked in existing research, and identifies regional disparities in FEP contributions, with developed economies leading research while developing regions remain underrepresented. From a practical perspective, the study provides insights into early-stage decision-making, identifying key FEP themes such as feasibility studies, risk assessment, and preliminary design, which can enhance project planning and execution. By analyzing leading journals and institutions it helps construction firms and policymakers align with best practices in structured planning. Additionally, the study encourages academic-industry collaboration that strengthens the link between research advancements and real-world project implementation, ensuring that FEP continues to evolve as a critical strategy for project success. Conclusion

Limitations of the Study
This bibliometric analysis offers valuable insights into construction front-end planning (FEP) research but has several limitations. First, it relies solely on Scopus-indexed publications, potentially omitting relevant studies from Web of Science, Google Scholar, and industry-specific sources. Second, the focus on quantitative indicators such as publication trends and citations does not assess the qualitative depth or practical applicability of the studies. Additionally, regional biases favor research from the United States, China, and the United Kingdom, limiting its generalizability to underrepresented regions. Lastly, emerging trends like AI, BIM, and digital decision-making tools may not yet be fully reflected in the literature. Despite these limitations, this study provides a comprehensive foundation for understanding construction front-end planning research trends, guiding future studies toward a more inclusive and technologically adaptive approach in construction project management.

Conclusion

This study provides a comprehensive bibliometric analysis of front-end planning (FEP) in construction research from 2010 to 2024. It examines the publication trends, key contributors, and dominant research themes. The findings reveal fluctuation in research engagement, with a significant increase in publications in recent years. Hence, this reflects a growing recognition of FEP's role in construction project success. However, the disparities remain as developed economies, particularly the United States, China, and the United Kingdom, dominate FEP research, while contributions from developing regions remain limited. The study also highlights inconsistencies in FEP terminology, with various definitions and conceptual frameworks used across the literature. This lack of standardization may hinder the practical application of FEP principles in diverse construction contexts, emphasizing the need for a more unified approach. Furthermore, the bibliometric analysis identifies feasibility studies, risk assessment, and structured decision-making as critical themes in FEP research. These aspects are central to improving project outcomes by enhancing early-stage planning effectiveness and reducing uncertainties. Moreover, the dominance of specific journals and conferences in FEP research further confirms the field's fragmentation. While some outlets prioritize high publication volume, others maintain stronger citation impact. This imbalance suggests a need for greater consolidation and quality-driven contributions to strengthen the field's academic and practical relevance. lastly, future research should address the observed regional and conceptual disparities, promote a standardized framework for FEP, and encourage broader global participation. Strengthening structured planning methodologies will ensure that FEP continues to evolve as a strategic tool for enhancing project efficiency, reducing risks, and improving overall construction project performance.

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