

The Fiscal–Procurement–Quality Nexus In Public Construction: A Systematic Review Of Construction Capital Expenditure, Bid Prices, And Project Quality

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ABSTRACT

Construction capital expenditure is a strategic fiscal instrument for delivering public infrastructure, but its contribution to construction quality is not determined solely by the size of the allocated budget. In public construction projects, fiscal allocation is converted into project outcomes through cost estimation, procurement mechanisms, contractor bidding behaviour, bid price reasonableness, contractor capability, risk management, contract functions, and quality control. This study systematically reviews the relationship between construction capital expenditure, bid price, and construction quality in public construction projects. A PRISMA-based Systematic Literature Review was conducted by synthesizing 57 selected scholarly sources consisting of 39 core synthesis sources, 11 included-with-caution sources, and 7 supporting references. The novelty of this study lies in the development of a fiscal–procurement–quality framework that positions bid price as a conceptual mediating mechanism between construction capital expenditure and construction quality. By integrating Public Fiscal Theory, the Cost-Based Pricing Perspective, and the Resource-Based View, this review explains how public fiscal allocation is translated into contractor implementation capacity and construction quality through procurement mechanisms. The findings identify five dominant themes: construction capital expenditure and budget governance, bid price formation and public procurement, contractor capability and performance, construction quality and quality risk, and digital cost–quality governance. Practically, the study emphasizes value-based procurement, rational bid price evaluation, contractor capability assessment, risk-based project control, contract-function governance, and digital transparency to improve construction quality in public construction projects.

INTRODUCTION

Public construction projects play a critical role in transforming fiscal resources into infrastructure assets that support public service delivery, economic productivity, territorial

connectivity, and long-term social welfare. In this context, construction capital expenditure is not merely an accounting category or an annual budget allocation; it represents the state's fiscal capacity to finance infrastructure planning, design, procurement, construction execution, supervision, safety management, and quality assurance. Public finance literature emphasizes that government expenditure should generate public value through efficient allocation, accountable spending, and long-term welfare creation (Musgrave & Musgrave, 1989). In the construction sector, this fiscal logic becomes more complex because construction capital expenditure must be converted into technical specifications, owner estimates, procurement decisions, contractor bids, contract values, and physical construction outputs.

The effectiveness of construction capital expenditure depends on the quality of budget governance. Studies on public budgeting show that construction capital expenditure allocation is influenced by fiscal capacity, local revenue, budget ratcheting, spending review, preventive supervision, and performance-based budgeting (Dewata et al., 2022; Kasdy et al., 2019; Marlina, 2019; Rahmat et al., 2020). In infrastructure development, cooperation between government and private entities also becomes an important mechanism to expand fiscal capacity and accelerate public infrastructure delivery (Alif et al., 2024). These studies indicate that construction capital expenditure should not be evaluated only through budget absorption, but also through its ability to produce reliable, durable, safe, and functional public assets.

Construction management literature further shows that weak budget planning, cost escalation, poor cost control, and inadequate risk allocation may reduce project performance and threaten construction quality. Cost overrun risks have been shown to emerge from multi-stakeholder factors and decision-making complexity in construction projects (Abdelalim et al., 2025). Cost and schedule performance are also influenced by the realism of budget planning, project constraints, and implementation control (Aldossari, 2025; Liu et al., 2019). Studies on construction cost budget control demonstrate the need for systematic cost planning models to maintain project feasibility and prevent financial inefficiency (Li & Li, 2022; J. Yang et al., 2024). In addition, safety budgeting and health-risk estimation studies indicate that construction budgets must incorporate safety, health, and social-risk components to support sustainable construction outcomes (Alba-Rodríguez et al., 2025; Farshadnia et al., 2018; K. Yang et al., 2021).

Construction capital expenditure does not directly guarantee construction quality. The allocated budget must first be translated into procurement documents, owner-estimated prices, bid prices, contract values, and contractor resource allocation. Within this chain, bid price becomes a critical mechanism because it reflects the contractor's interpretation of cost, risk, competition, technical feasibility, and implementation capacity. Studies on contractors' bidding decisions show that bid prices are affected by project risk, competitive pressure, indirect cost estimation, uncertainty, pandemic-related disruptions, and contractor strategy (Adianto et al., 2022; Artopo et al., 2025; Firmansyah, 2025; Iyer et al., 2023; Johantri et al., 2021; Maqfirah et al., 2025; Oyeyipo et al., 2016). In public procurement contexts, price reasonableness and lowest-bid risk are particularly important because underpriced bids may weaken project sustainability and construction quality (Arifin & Arviansyah, 2024; Artopo et al., 2025; Dewi & Susetyo, 2022; Firmansyah, 2025; Gede et al., 2023; Ly, 2023; Subrata et al., 2020).

Construction quality is multidimensional. It includes technical compliance, material reliability, workmanship, safety, durability, functionality, and long-term public value. Previous studies have examined construction quality through reliability evaluation, quality databases, quality-risk propagation, coupling relationship analysis, subcontractor control, contract change orders, risk management strategies, and critical quality factors (Bai & Zhao, 2018; Daxiao et al., 2020; Haiyirete et al., 2025; James et al., 2025; S. Jiang et al., 2024; Xu et al., 2018; Zhang & Tsai, 2021). Contractor capability also affects whether fiscal resources and bid prices can be transformed into quality outcomes. Contractor assessment studies emphasize the importance of technical capacity, financial strength, non-price performance indicators, stakeholder coordination, tender examination quality, contract functions, and multi-criteria performance assessment (Alfalah et al., 2024; Alkilani & Loosemore, 2024; Gunasekara et al., 2021; Jasim, 2021; Mahadik & Topkar, 2023; Matto, 2025; M. Yang et al., 2025).

Despite this growing body of knowledge, existing studies remain fragmented. Public finance studies tend to focus on construction capital expenditure and budget accountability; procurement studies examine bid price and tender evaluation; contractor performance studies analyse capability and resource mobilization; and construction quality studies focus on technical compliance and quality risks. Limited research has integrated construction capital expenditure, bid price, contractor capability, contract functions, risk management, digital governance, and construction quality into a single conceptual framework. This gap is important because construction quality in public projects is shaped by a fiscal–procurement–implementation chain: construction capital expenditure provides fiscal input, bid price functions as the procurement mechanism, contractor capability and contract functions determine implementation capacity, and construction quality represents the final project outcome.

Broader organizational and financial studies also indicate that external disruptions, governance mechanisms, and managerial strategies can influence institutional performance and decision-making. The COVID-19 pandemic, for example, affected financial and market performance across Indonesian business sectors, showing that macro-level disruptions may alter organizational capacity, risk exposure, and financial decision-making (Oppusunggu et al., 2023). In the construction procurement context, such disruption is relevant because bid price formation, contractor capability, and project execution may be affected by uncertainty in material prices, labor availability, financial liquidity, and market conditions. Therefore, the fiscal–procurement–quality relationship should be understood within a broader governance and risk environment.

Previous studies have contributed significantly to understanding construction cost control, public procurement, contractor performance, risk management, contract functions, and construction quality. However, as noted above, these contributions are distributed across different domains and are seldom connected in a single explanatory model. Public finance studies mainly focus on budget allocation and fiscal accountability; procurement studies emphasize bid price formation, lowest-bid risks, and tender evaluation; contractor performance studies examine capability, contract functions, and resource mobilization; while construction quality studies focus on technical compliance, quality-risk propagation, and defect prevention. Only a limited number of studies have attempted to integrate these streams

into a framework that explains how construction capital expenditure influences construction quality through bid price as a procurement-based mediating mechanism.

This study responds to that gap by conducting a Systematic Literature Review to synthesize previous studies on construction capital expenditure, bid price, contractor performance, contract functions, risk management, and construction quality in public construction projects. Specifically, it aims to map research trends, identify dominant themes, examine methodological and theoretical patterns, and develop a conceptual framework that positions bid price as a proposed mediating mechanism between construction capital expenditure and construction quality. The novelty of this study lies in the integration of Public Fiscal Theory, the Cost-Based Pricing Perspective, and the Resource-Based View into an input-mechanism-impact framework linking fiscal management, bidding behaviour, contractor capability, risk governance, and construction outcomes. It conceptualizes construction capital expenditure not merely as a fiscal allocation but as a strategic input that shapes cost estimation accuracy, procurement readiness, and quality-oriented project feasibility; it positions bid price as a mediating mechanism that translates fiscal allocation into contractor implementation capacity, resource allocation, and quality assurance; and it extends the fiscal-procurement-quality relationship by incorporating contractor capability, contract functions, risk management, and digital cost-quality governance as implementation conditions that may strengthen or weaken the relationship between bid price reasonableness and construction quality. Accordingly, this review provides a new conceptual contribution by developing a fiscal-procurement-quality framework for public construction project governance.

METHODS

Research Design

This study adopts a Systematic Literature Review (SLR) design to identify, evaluate, classify, and synthesise prior research on construction capital expenditure, bid price, and construction quality in public construction projects. The SLR approach is appropriate because the topic spans public finance, construction procurement, cost estimation, contractor performance, risk management, contract governance, digital governance, and quality management. The review follows a PRISMA-based process consisting of identification, screening, eligibility assessment, and inclusion.

In addition to the PRISMA flow, the review applies structured quality assessment, data extraction, descriptive analysis, thematic analysis, and research gap mapping. To maintain methodological clarity, the selected studies are grouped into three categories: core synthesis sources, included-with-caution sources, and supporting references. Core synthesis sources are used in the main thematic synthesis; included-with-caution sources are used selectively to enrich contextual interpretation when their analytical focus is only partially aligned with the core variables; while supporting references are used to strengthen theoretical framing and broader contextual discussion. This distinction is necessary because the reviewed literature includes empirical construction studies, digital construction studies, public budgeting studies, contractor performance studies, and foundational theoretical works.

Research Questions

This study is guided by five research questions:

RQ1: How have studies on construction capital expenditure, bid price, and construction quality developed in the reviewed literature?

RQ2: What dominant themes emerge from studies on construction capital expenditure, bid price, and construction quality in public construction projects?

RQ3: How is bid price conceptualized as a mediating mechanism between construction capital expenditure and construction quality?

RQ4: What methodological and theoretical approaches are commonly used in this research area?

RQ5: What research gaps and future research directions can be formulated based on the reviewed literature?

Search Strategy

The literature search was designed to capture studies related to construction capital expenditure, construction budgeting, public procurement, bid price, contractor performance, cost control, cost overrun, risk management, contract functions, digital construction governance, and construction quality. The search was conducted through academic databases and bibliography tracing. The main databases included Scopus, Web of Science, ScienceDirect, Emerald, Springer, Taylor & Francis, and Google Scholar, complemented by Sinta-indexed journals and manual bibliography tracing of relevant articles.

The publication period targeted was predominantly 2016–2025, with earlier classical theoretical works included as theoretical anchors when necessary. The search covered journal articles, selected conference proceedings, and theoretical references written in English and Indonesian, provided that full texts were available and that the studies had clear analytical relevance to at least one research question. The main keywords included “construction capital expenditure”, “construction budget”, “public construction project”, “bid price”, “lowest bid”, “tender price”, “contractor performance”, “construction quality”, “cost control”, “cost overrun”, “risk management”, “contract functions”, “public procurement”, “BIM 5D”, and “digital twin”. A typical search logic combined these terms as follows: (“construction budget” OR “construction capital expenditure” OR “construction spending”) AND (“bid price” OR “lowest bid” OR “tender price”) AND (“construction quality” OR “project performance” OR “contractor performance”).

Table 6. Search Strategy

Component	Description
Sources	Scopus, Web of Science, ScienceDirect, Emerald, Springer, Taylor & Francis, Google Scholar, Sinta-indexed journals, and bibliography tracing
Publication period	Dominantly 2016–2025, with classical theoretical works used as theoretical anchors
Language	English and Indonesian
Document type	Journal articles, selected proceedings, and theoretical references
Main keywords	construction capital expenditure; construction budget; bid price; tender price; lowest bid; construction quality; contractor performance; cost control; cost overrun; public procurement; BIM; digital twin

Search logic	(“construction budget” OR “construction capital expenditure” OR “construction spending”) AND (“bid price” OR “lowest bid” OR “tender price”) AND (“construction quality” OR “project performance” OR “contractor performance”)
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Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were formulated to ensure that the selected studies were relevant to the fiscal–procurement–quality nexus in public construction projects. Studies were included if they met the following conditions: (1) addressed construction capital expenditure, budgeting, procurement, bid price, contractor performance, cost control, cost overrun, or construction quality; (2) were published mainly between 2016 and 2025, with exceptions for foundational theories directly linked to the conceptual model; (3) were available in full text; (4) had clear analytical relevance to at least one of the research questions; and (5) were written in English or Indonesian.

Studies were excluded if they: (1) were unrelated to construction, procurement, project quality, or fiscal/project performance; (2) fell outside the main publication period without serving as foundational theoretical references; (3) were only available as abstracts without full text; (4) consisted of opinion pieces, blogs, or non-academic documents; or (5) were theoretical sources not connected to the proposed conceptual framework. These criteria were applied consistently during the screening and eligibility stages

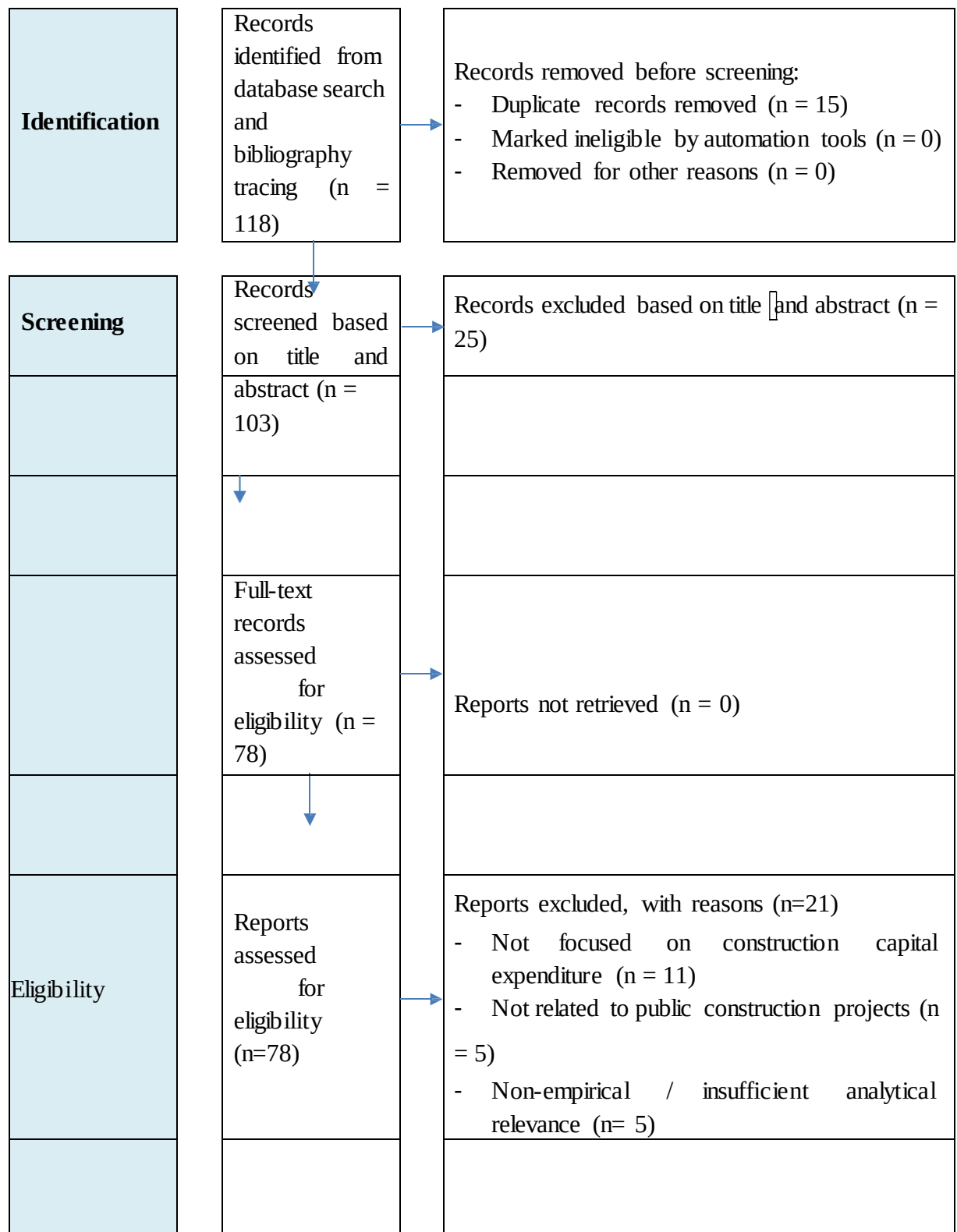
Table 7. Inclusion and Exclusion Criteria

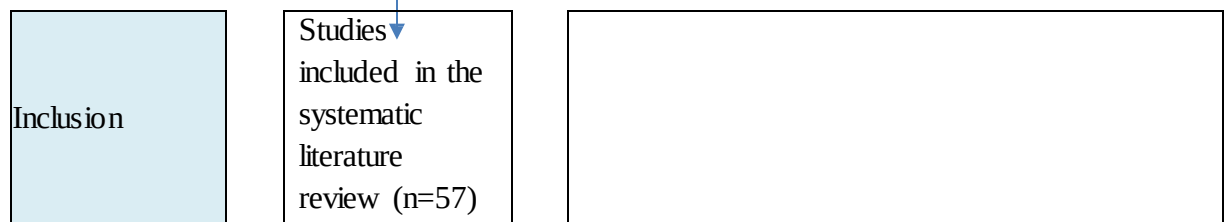
Inclusion criteria	Exclusion criteria
Studies related to construction capital expenditure, budgeting, procurement, bid price, contractor performance, cost control, or construction quality	Studies unrelated to construction, procurement, project quality, or fiscal/project performance

PRISMA Screening Process

The screening process followed the PRISMA logic of identification, screening, eligibility, and inclusion. A total of 118 records were initially identified from database searches and bibliography tracing. After removing duplicate records, the remaining studies were screened based on titles and abstracts to assess their relevance to construction capital expenditure, bid price, contractor performance, and construction quality in public construction projects. Studies that clearly fell outside the construction or public procurement context, or that did not address fiscal or project performance issues, were excluded at this stages.

The full texts of the remaining records were then assessed for eligibility based on the inclusion and exclusion criteria. During this phase, studies were excluded for reasons such as insufficient analytical focus on the core variables (construction capital expenditure, bid price, construction quality), lack of methodological clarity, or limited relevance to public construction procurement. The final synthesis included 57 selected scholarly sources, consisting of 39 core synthesis sources, 11 included-with-caution sources, and 7 supporting references. These studies were then subjected to quality assessment and thematic synthesis



**Figure 2. (PRISMA Flow Diagram)****Table 8. PRISMA Screening Summary**

PRISMA stage	Description	Number
Identification	Records identified from database search and bibliography tracing	118
Duplicate removal	Duplicate records removed	15
Screening	Records screened based on title and abstract	103
Exclusion	Records excluded after title and abstract screening	25
Eligibility	Full-text records assessed for eligibility	78
Full-text exclusion	Excluded due to weak relevance, insufficient analytical connection, or non-core status	21
Inclusion	Sources included in final synthesis	57

Quality Assessment

Quality assessment was conducted to ensure that the reviewed literature is relevant and credible. The assessment follows five criteria: clarity of research objective, clarity of method, relevance to the topic, alignment between findings and research objective, and credibility of academic outlet. Each criterion was scored using a binary system, where 1 indicates that the criterion was met and 0 indicates that the criterion was not sufficiently met. Sources with a total score of 5 were categorized as high relevance, sources with a score of 4 were categorized as moderate-high relevance, and sources with a score of 3 were retained only when they provided relevant contextual or theoretical support.

Table 9. Quality Assessment Criteria

Code	Assessment question	Score
QA1	Is the research objective clearly stated?	0/1
QA2	Is the research method clearly explained?	0/1
QA3	Is the study relevant to construction capital expenditure, bid price, contractor performance, cost control, or construction quality?	0/1
QA4	Do the findings answer the research objective?	0/1
QA5	Is the study published in a credible academic outlet or used as a foundational theoretical reference?	0/1

Table 10. Quality Assessment Results

No.	Source	QA1	QA2	QA3	QA4	QA5	Total	Category	Decision
1	Abdelalim et al. (2025)	1	1	1	1	1	5	High relevance	Core synthesis
2	Adianto et al. (2022)	1	1	1	1	1	5	High relevance	Core synthesis
3	Agusjaya et al. (2023)	1	1	1	1	1	5	High relevance	Core synthesis
4	Alba-Rodríguez et al. (2025)	1	1	1	1	1	5	High relevance	Core synthesis
5	Aldossari (2025)	1	1	1	1	1	5	High relevance	Core synthesis
6	Alfalah et al. (2024)	1	1	1	1	1	5	High relevance	Core synthesis
7	Alif et al. (2024)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
8	Alkilani & Loosemore (2024)	1	1	1	1	1	5	High relevance	Core synthesis
9	Arifin & Arviansyah (2024)	1	1	1	1	1	5	High relevance	Core synthesis
10	Artopo et al. (2025)	1	1	1	1	0	4	Moderate-high relevance	Core synthesis
11	Bachtiar et al. (2022)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
12	Bai & Zhao (2018)	1	1	1	1	1	5	High relevance	Core synthesis

13	Barney (1991)	1	0	1	1	1	4	Theoretical relevance	Supporting reference
14	C. Jiang et al. (2023)	1	1	1	1	1	5	High relevance	Core synthesis
15	Daxiao et al. (2020)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
16	Dewata et al. (2022)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
17	Dewi & Susetyo (2022)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
18	Farhanah & Susilawati (2022)	1	1	0	1	1	4	Contextual relevance	Supporting reference
19	Farshadnia et al. (2018)	1	1	1	1	1	5	High relevance	Core synthesis
20	Firmansyah (2025)	1	1	0	1	1	4	Contextual relevance	Supporting reference
21	Gede et al. (2023)	1	1	1	1	1	5	High relevance	Core synthesis
22	Gharaibeh et al. (2024)	1	1	1	1	1	5	High relevance	Core synthesis
23	Gunasekara et al. (2021)	1	1	1	1	1	5	High relevance	Core synthesis

24	Haiyirete et al. (2025)	1	1	1	1	1	5	High relevance	Core synthesis
25	Hans & Anastasia (2024)	1	1	1	1	1	5	High relevance	Core synthesis
26	Hidayat (2024)	1	1	1	1	1	5	High relevance	Core synthesis
27	Iyer et al. (2023)	1	1	1	1	1	5	High relevance	Core synthesis
28	James et al. (2025)	1	1	1	1	1	5	High relevance	Core synthesis
29	Jasim (2021)	1	1	1	1	0	4	Moderate-high relevance	Core synthesis
30	Johantri et al. (2021)	1	1	1	1	0	4	Moderate-high relevance	Core synthesis
31	J. Yang et al. (2024)	1	1	1	1	1	5	High relevance	Core synthesis
32	K. Yang et al. (2021)	1	1	1	1	1	5	High relevance	Core synthesis
33	Kasdy et al. (2019)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
34	Li & Li (2022)	1	1	1	1	1	5	High relevance	Core synthesis

35	Liu et al. (2019)	1	1	1	1	1	5	High relevance	Core synthesis
36	Ly (2023)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
37	M. Yang et al. (2025)	1	1	1	1	1	5	High relevance	Core synthesis
38	Mahadik & Topkar (2023)	1	1	1	1	1	5	High relevance	Core synthesis
39	Maqfirah et al. (2025)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
40	Marlina (2019)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
41	Matto (2025)	1	1	1	1	1	5	High relevance	Core synthesis
42	Musgrave & Musgrave (1989)	1	0	1	1	1	4	Theoretical relevance	Supporting reference
43	Nurhakim et al. (2024)	1	1	0	1	1	4	Contextual relevance	Supporting reference
44	Oo et al. (2025)	1	1	1	1	1	5	High relevance	Core synthesis

45	Oppusunggu et al. (2023)	1	1	0	1	1	4	Contextual relevance	Supporting reference
46	Oyeyipo et al. (2016)	1	1	1	1	1	5	High relevance	Core synthesis
47	Rahmat et al. (2020)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
48	S. Jiang et al. (2024)	1	1	1	1	1	5	High relevance	Core synthesis
49	Sabri et al. (2021)	1	1	1	1	0	4	Moderate-high relevance	Core synthesis
50	Sadick et al. (2025)	1	1	1	1	1	5	High relevance	Core synthesis
51	Santoso et al. (2023)	1	1	1	1	1	5	High relevance	Core synthesis
52	Shan et al. (2024)	1	1	1	1	1	5	High relevance	Core synthesis
53	Subrata et al. (2020)	1	1	1	1	0	4	Moderate-high relevance	Included with caution
54	Syaferi et al. (2021)	1	1	1	1	0	4	Moderate-high relevance	Core synthesis
55	Widyaningsih et al. (2020)	1	1	0	1	1	4	Contextual relevance	Supporting reference

56	Xu et al. (2018)	1	1	1	1	1	5	High relevan ce	Core synthe sis
57	Zhang & Tsai (2021)	1	1	1	1	1	5	High relevan ce	Core synthe sis

Quality assessment was carried out to ensure that the studies included in this review met minimum standards of methodological rigour and analytical relevance. Each study was evaluated using five quality assessment criteria (QA1–QA5) adapted from common SLR and PRISMA guidelines: clarity of research objectives (QA1), transparency of research design and methods (QA2), adequacy of data and analysis (QA3), explicitness of links to construction capital expenditure, bid price, or construction quality (QA4), and contribution to theoretical or practical understanding of public construction procurement (QA5). Each criterion was scored on a simple scale, and the total score was used to classify the studies into different quality categories.

To maintain analytical consistency, the studies were then grouped into three categories: core synthesis sources, included-with-caution sources, and supporting references. Core synthesis sources are studies that show clear methodological rigour and strong relevance to at least one of the three main variables (construction capital expenditure, bid price, construction quality). These sources form the backbone of the thematic synthesis and are used systematically in developing the fiscal–procurement–quality framework. Included-with-caution sources are studies that provide useful insights but have certain limitations, such as a narrower focus, limited methodological detail, or partial relevance to the main variables. These sources are used selectively to enrich interpretation and contextual discussion. Supporting references are theoretical and contextual studies that do not directly analyse the three main variables but are important for explaining broader fiscal, governance, or organisational issues that underpin the proposed framework.

The final synthesis comprised 57 selected scholarly sources, consisting of 39 core synthesis sources, 11 included-with-caution sources, and 7 supporting references. This categorisation ensures that the thematic findings are primarily built on high-relevance and high-quality studies, while still allowing the review to draw on contextual and theoretical literature when necessary. Table 10 presents the list of selected studies, their quality assessment classification, and their role in the synthesis.

Data Extraction and Thematic Classification

Data were extracted based on author, year, research focus, methodological tendency, theoretical relevance, key findings, research gap, and thematic classification. The extracted literature was classified into five main themes: construction capital expenditure and budget governance, bid price formation and public procurement, contractor capability and performance, construction quality and quality risk, and digital cost–quality governance.

Table 11. Data Extraction Framework

Element	Description
Author and year	Bibliographic identity of the source
Country/context	National, regional, or project context discussed
Objective/focus	Main purpose or research focus
Methodological tendency	Quantitative, qualitative, case study, model development, conceptual, digital/AI-based, or review
Theory/concept	Theoretical or conceptual basis used in the study
Key finding	Main finding related to construction capital expenditure, bid price, contractor performance, cost control, risk management, contract functions, or quality
Research gap	Limitation or future research opportunity
Theme	Assigned thematic cluster

Table 12. Thematic Classification of the Reviewed Literature

Theme	Sources	Main Contribution
Construction capital expenditure and budget governance	Abdelalim et al. (2025); Alba-Rodríguez et al. (2025); Aldossari (2025); Alif et al. (2024); Artopo et al. (2025); Dewata et al. (2022); Farshadnia et al. (2018); Kasdy et al. (2019); Li & Li (2022); Liu et al. (2019); Marlina (2019); Rahmat et al. (2020); J. Yang et al. (2024); K. Yang et al. (2021)	Explains construction capital expenditure as fiscal input, cost-control mechanism, and safety-quality budget foundation
Bid price formation and public procurement	Adianto et al. (2022); Arifin & Arviansyah (2024); Dewi & Susetyo (2022); Gede et al. (2023); Iyer et al. (2023); Johantri et al. (2021); Ly (2023); Maqfirah et al. (2025); Oyeyipo et al. (2016); Subrata et al. (2020)	Explains bid price as procurement mechanism, tender behavior, and cost-reasonableness signal
Contractor capability and performance	Agusjaya et al. (2023); Alfalah et al. (2024); Alkilani & Loosemore (2024); Bachtiar et al. (2022); Gunasekara et al. (2021); Hans & Anastasia (2024); Jasim (2021); Mahadik & Topkar (2023); Matto (2025); Sabri et al. (2021); Syaferi et al. (2021); M. Yang et al. (2025)	Explains contractor capability, contract functions, and performance as implementation conditions affecting the bid price–quality relationship

Construction quality and quality risk	Bai & Zhao (2018); Daxiao et al. (2020); Haiyirete et al. (2025); Hidayat (2024); James et al. (2025); S. Jiang et al. (2024); Xu et al. (2018); Zhang & Tsai (2021)	Explains quality as multidimensional outcome affected by technical, managerial, risk, and contract-related factors
Digital cost–quality governance	C. Jiang et al. (2023); Gharaibeh et al. (2024); Oo et al. (2025); Sadick et al. (2025); Santoso et al. (2023); Shan et al. (2024)	Explains digital tools as mechanisms for cost estimation, transparency, monitoring, and quality governance
Theoretical/contextual support	Barney (1991); Farhanah & Susilawati (2022); Firmansyah (2025); Musgrave & Musgrave (1989); Nurhakim et al. (2024); Oppusunggu et al. (2023); Widyaningsih et al. (2020)	Supports theoretical framing, governance logic, asset management, and broader management context

Data Analysis

The data were analyzed using descriptive analysis, thematic analysis, theoretical synthesis, and research gap mapping. Descriptive analysis was used to identify publication trends, research contexts, and methodological tendencies. Thematic analysis was used to classify the literature into five dominant themes. Theoretical synthesis was used to integrate Public Fiscal Theory, Cost-Based Pricing Perspective, and Resource-Based View into an

input–mechanism–impact framework. Research gap mapping was used to identify future research opportunities and formulate the proposed conceptual framework.

RESULTS

Publication Trend

The reviewed literature shows a clear shift from conventional cost and bidding studies toward more integrated perspectives that connect cost control, contractor performance, risk management, contract functions, digital construction governance, and quality risk management. Earlier studies tended to focus on contractors' bidding decisions, quality reliability, safety budgeting, public fiscal allocation, and time–budget constrained planning (Artopo et al., 2025; Bai & Zhao, 2018; Farshadnia et al., 2018; Firmansyah, 2025; Kasdy et al., 2019; Liu et al., 2019; Oyeyipo et al., 2016). Studies published between 2020 and 2022 expanded the discussion to include under-80% bidding policy, labour–subcontractor control, performance-based budgeting, contractor qualification, indirect cost estimation, public bid prices during the pandemic, contractor performance, and price reasonableness in government construction tenders (Adianto et al., 2022; Bachtiar et al., 2022; Daxiao et al., 2020; Dewata et al., 2022; Dewi & Susetyo, 2022; Jasim, 2021; Johantri et al., 2021; Sabri et al., 2021; Subrata et al., 2020; Syaferi et al., 2021).

More recent studies from 2023 to 2025 increasingly emphasise digitalization, BIM, digital twin, artificial intelligence, machine learning, adaptive resource control, contractor selection, stakeholder influence, contract functions, risk management strategies, quality-risk propagation, and cost-overrun analysis (Abdelalim et al., 2025; Alfalah et al., 2024; Alkilani & Loosemore, 2024; Gharaibeh et al., 2024; Haiyirete et al., 2025; James et al., 2025; C. Jiang et al., 2023; Matto, 2025; Oo et al., 2025; Sadick et al., 2025; Santoso et al., 2023; Shan et al., 2024; M. Yang et al., 2025). This trend indicates that research in public construction performance is moving from isolated cost and quality assessment toward integrated fiscal, procurement, contractor capability, risk governance, and digital governance perspectives.

Table 13. Publication Trend by Period

Period	Dominant Focus	Representative Sources
2016–2019	Bidding decisions, fiscal allocation, cost planning, safety budgeting, and quality reliability	Bai & Zhao (2018); Farshadnia et al. (2018); Kasdy et al. (2019); Liu et al. (2019); Oyeyipo et al. (2016)
2020–2022	Low-bid policy, performance-based budgeting, contractor qualification, indirect cost estimation, tender price reasonableness, and contractor performance	Adianto et al. (2022); Bachtiar et al. (2022); Dewata et al. (2022); Dewi & Susetyo (2022); Daxiao et al. (2020); Jasim (2021); Johantri et al. (2021); Sabri et al. (2021); Subrata et al. (2020); Syaferi et al. (2021)

2023–2025	BIM, digital twin, AI budgeting, machine learning, contractor selection, risk management, contract functions, quality-risk propagation, and cost overrun risk	Abdelalim et al. (2025); Artopo et al. (2025); Gharaibeh et al. (2024); Haiyirete et al. (2025); James et al. (2025); M. Yang et al. (2025); Matto (2025); Oo et al. (2025); Sadick et al. (2025); Santoso et al. (2023); Shan et al. (2024)
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Distribution by Research Context and Journal Type

The reviewed literature spans both international and Indonesian contexts. International studies are more dominant in cost-overrun analysis, contractor performance modelling, digital construction governance, BIM, machine learning, artificial intelligence, risk management, contract functions, and quality-risk propagation. Indonesian studies, by contrast, provide strong contextual relevance in relation to public budgeting, owner estimates, low-bid policy, contractor qualification, construction bid prices during the Covid-19 period, BIM 5D implementation, contract change orders, and public construction procurement.

This distribution is important because it shows that the international literature contributes stronger methodological and technological development, while Indonesian studies provide institutional and regulatory relevance for public-sector construction practice. Together, these two streams enrich the review by linking broader global developments with local public procurement realities.

Table 14. Distribution by Research Context

Context	Main Focus	Representative Sources
Indonesia	Construction capital expenditure, public budgeting, owner estimates, low-bid policy, contractor qualification, CCO, BIM 5D, and bid price during the pandemic	Adianto et al. (2022); Arifin & Arviansyah (2024); Artopo et al. (2025); Bachtiar et al. (2022); Dewata et al. (2022); Dewi & Susetyo (2022); Gede et al. (2023); Hidayat (2024); Johantri et al. (2021); Kasdy et al. (2019); Rahmat et al. (2020); Santoso et al. (2023); Subrata et al. (2020); Syaferi et al. (2021)
International	Cost overrun, contractor performance, quality risk, risk management, contract functions, digital twin, BIM, AI budgeting, and ML bidding prediction	Abdelalim et al. (2025); Aldossari (2025); Alfalah et al. (2024); Alkilani & Loosemore (2024); Gharaibeh et al. (2024); Haiyirete et al. (2025); James et al. (2025); Jasim (2021); M. Yang et al. (2025); Matto (2025); Oo et al. (2025); Sadick et al. (2025); Shan et al. (2024)

Theoretical/contextual	Public finance, RBV, governance, strategic asset management, broader financial/managerial context	Barney (1991); Firmansyah (2025); Farhanah & Susilawati (2022); Musgrave & Musgrave (1989); Oppusunggu et al. (2023); Widyaningsih et al. (2020)
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Methodological Trends

The reviewed studies display diverse methodological approaches. Quantitative methods are commonly used in studies on budgeting, contractor performance, cost control, and construction quality. Case studies and descriptive analyses are frequently employed to explain public procurement, owner estimates, low-bid policy, contract change orders, pandemic-related bid prices, and BIM implementation.

Model-development studies appear in research on contractor assessment, cost budget control, AI-based budgeting, quality evaluation, multi-criteria contractor performance assessment, and machine learning-based bidder prediction. In addition, mixed-method and risk-management studies help explain contractor behaviour, contract functions, and project performance under uncertainty. This methodological diversity indicates that the field is no longer dominated by traditional procurement analysis alone, but has expanded into predictive, evaluative, and decision-support approaches.

Table 15. Methodological Trends

Methodological Tendency	Main Use	Representative Sources
Quantitative analysis	Examining relationships among cost, budget, contractor performance, and quality	Agusjaya et al. (2023); Artopo et al. (2025); Dewata et al. (2022); Kasdy et al. (2019); Santoso et al. (2023); Syaferi et al. (2021)
Case study/descriptive analysis	Explaining public procurement, low-bid policy, owner estimates, CCO, contractor performance, and construction implementation	Adianto et al. (2022); Arifin & Arviansyah (2024); Gede et al. (2023); Hidayat (2024); Johantri et al. (2021); Sabri et al. (2021); Subrata et al. (2020)
Model development/decision model	Developing cost, contractor, quality, and risk assessment models	Abdelalim et al. (2025); Alfalah et al. (2024); Bai & Zhao (2018); Jasim (2021); Mahadik & Topkar (2023); J. Yang et al. (2024)

Risk management/mixed-method	Explaining risk strategies, contract functions, and contractor performance behavior	James et al. (2025); M. Yang et al. (2025)
Digital/AI-based method	Supporting digital cost-quality governance and predictive decision-making	Gharaibeh et al. (2024); C. Jiang et al. (2023); Oo et al. (2025); Sadick et al. (2025); Shan et al. (2024)
Theoretical/conceptual support	Building conceptual foundation and interpretation	Barney (1991); Musgrave & Musgrave (1989)

Theoretical Trends

The reviewed literature reveals three main theoretical perspectives. Public Fiscal Theory explains why construction capital expenditure should generate public value and infrastructure quality. The Cost-Based Pricing Perspective explains how bid price reflects cost realism, risk calculation, and contractor implementation capacity. The Resource-Based View explains why contractor capability is necessary to transform financial resources into quality outputs.

Beyond these three dominant perspectives, additional concepts such as quality-risk management, contract governance, digital construction governance, and performance-based budgeting help explain project outcomes more comprehensively. These supporting concepts strengthen the argument that construction quality is shaped not by a single factor, but by an interconnected chain involving fiscal input, procurement mechanisms, implementation capability, and project control.

Table 16. Theoretical and Conceptual Trends

Theory/Concept	Role in This Review	Representative Sources
Public Fiscal Theory	Explains construction capital expenditure as fiscal input and public value instrument	Dewata et al. (2022); Kasdy et al. (2019); Musgrave & Musgrave (1989); Rahmat et al. (2020)
Cost-Based Pricing Perspective	Explains bid price formation, cost realism, and tender behavior	Adianto et al. (2022); Artopo et al. (2025); Iyer et al. (2023); Johantri et al. (2021); Maqfirah et al. (2025); Oyeyipo et al. (2016)
Resource-Based View	Explains contractor capability and resource mobilization	Barney (1991); Alfalah et al. (2024); Gunasekara et al. (2021); Jasim (2021); Matto (2025); Sabri et al. (2021); Syaferi et al. (2021)

Quality-risk management	Explains construction quality as system-level project outcome	Bai & Zhao (2018); Haiyirete et al. (2025); James et al. (2025); S. Jiang et al. (2024); Xu et al. (2018); Zhang & Tsai (2021)
Contract governance	Explains how contract functions influence contractor performance behavior	Matto (2025); M. Yang et al. (2025)
Digital cost–quality governance	Explains digital tools for estimation, transparency, monitoring, and quality control	Gharaibeh et al. (2024); Oo et al. (2025); Sadick et al. (2025); Santoso et al. (2023); Shan et al. (2024)

Theme 1: Construction capital expenditure and Budget Governance

The first theme concerns construction capital expenditure, budget governance, cost control, safety budgeting, and fiscal accountability. Public budgeting studies show that construction capital expenditure is influenced by fiscal capacity, local revenue, balancing funds, budget ratcheting, performance-based budgeting, and spending review mechanisms (Artopo et al., 2025; Dewata et al., 2022; Kasdy et al., 2019; Marlina, 2019; Rahmat et al., 2020). These studies indicate that construction capital expenditure should not be assessed solely through budget absorption, but through its ability to produce measurable and durable infrastructure outcomes.

In construction management, studies on cost overrun and cost control show that weak budget planning can affect project performance, delay implementation, and reduce quality outcomes (Abdelalim et al., 2025; Aldossari, 2025; Firmansyah, 2025; Li & Li, 2022; Liu et al., 2019; J. Yang et al., 2024). Safety budgeting studies further demonstrate that construction capital expenditure must incorporate health, safety, and social-risk components in order to prevent downstream quality and safety failures (Alba-Rodríguez et al., 2025; Farshadnia et al., 2018; K. Yang et al., 2021). Taken together, these studies support the view that construction capital expenditure should be understood not merely as fiscal allocation, but as a fiscal and managerial input that shapes project feasibility and quality readiness.

Theme 2: Bid Price Formation and Public Procurement

The second theme focuses on bid price formation, tender behaviour, price reasonableness, owner estimates, pandemic-related bid-price disruption, and low-bid risk. Studies on contractor bidding show that bid price is influenced by indirect cost estimation, uncertainty, project risk, market competition, pandemic conditions, and contractor strategy (Adianto et al., 2022; Iyer et al., 2023; Johantri et al., 2021; Maqfirah et al., 2025; Oyeyipo et al., 2016). In public construction projects, bid price functions as the mechanism through which fiscal allocation is translated into contractor resource commitments.

Low-bid procurement emerges as a central issue in this theme. Studies on lowest-bid risk and bid-price reasonableness show that excessive price reduction may create hidden risks when technical and financial feasibility is not adequately assessed (Arifin & Arviansyah, 2024; Dewi & Susetyo, 2022; Gede et al., 2023). Studies on low-bid factors and under-80% bidding policy further suggest that irrational bid prices may affect cost performance, user satisfaction, and construction quality (Ly, 2023; Subrata et al., 2020). These findings support

the argument that bid price can be conceptualized as a proposed mediating mechanism between construction capital expenditure and construction quality.

Theme 3: Contractor Capability and Performance

The third theme concerns contractor capability, contractor qualification, stakeholder management, contract functions, resilience, and performance evaluation. Contractor performance studies show that construction outcomes depend on technical capacity, financial strength, non-price performance indicators, safety records, quality management systems, tender examination quality, contract functions, and multi-criteria performance assessment (Alfalah et al., 2024; Gunasekara et al., 2021; Jasim, 2021; Mahadik & Topkar, 2023; Matto, 2025; M. Yang et al., 2025). Stakeholder influence also affects project performance because construction outcomes depend on coordination among owners, contractors, consultants, subcontractors, regulators, and users (Alkilani & Loosemore, 2024).

Contractor qualification is particularly important in public construction because bid price must be evaluated together with the contractor's capability to deliver the project. Indonesian evidence suggests that contractor qualification affects project quality (Bachtiar et al., 2022), while working capital and financial capacity also influence project performance by shaping the contractor's ability to execute construction activities effectively (Agusjaya et al., 2023; Hans & Anastasia, 2024). Studies on road project development and contractor performance during the Covid-19 period further show that contractor capability must be assessed not only in terms of technical competence, but also in terms of resilience, adaptability, and the ability to sustain project performance under uncertainty (Sabri et al., 2021; Syaferi et al., 2021). Thus, contractor capability can be understood as an implementation condition that strengthens or weakens the relationship between bid price and construction quality.

Theme 4: Construction Quality and Quality Risk

The fourth theme addresses construction quality, quality evaluation, quality-risk propagation, subcontractor control, contract change, and risk management strategies. Construction quality studies show that quality can be evaluated through reliability models, IFC-based databases, quality-risk networks, coupling relationship analysis, and critical factor identification (Bai & Zhao, 2018; Haiyirete et al., 2025; S. Jiang et al., 2024; Xu et al., 2018; Zhang & Tsai, 2021). Risk-management studies also show that unmanaged risks can affect cost, schedule, safety, and quality outcomes (James et al., 2025). These findings indicate that construction quality is not merely a technical output, but a system-level result of planning, procurement, implementation, supervision, risk management, and project control.

Labour-subcontractor control also affects quality because subcontracting arrangements influence workmanship, site coordination, and supervision (Daxiao et al., 2020). Contract change orders may disrupt cost, time, and quality performance when project changes are not managed effectively (Hidayat, 2024). These findings reinforce the argument that construction quality problems often begin before physical execution starts, particularly during budget planning, tender evaluation, risk allocation, contract design, and contractor selection.

Theme 5: Digital Cost–Quality Governance

The fifth theme highlights the growing role of digital tools in improving cost planning, bid evaluation, project monitoring, and quality governance. BIM adoption can improve construction management by enhancing cost estimation, design coordination, information

integration, and project control (Gharaibeh et al., 2024). BIM 5D further links design information with cost and schedule performance, making it particularly relevant to cost–quality governance (Santoso et al., 2023). Digital twin applications extend this logic by improving monitoring, simulation, and decision-making in construction project management (Shan et al., 2024).

Advanced analytics also strengthen the fiscal–procurement–quality relationship. Adaptive resource-flow control can optimize construction work and cash flow (C. Jiang et al., 2023). Explainable machine learning can predict the number of bidders in competitive bidding, which is relevant for understanding tender competition and bid-price behaviour (Oo et al., 2025). Artificial intelligence-based budget decision-making can improve early-stage construction budgeting and estimation accuracy (Sadick et al., 2025). Taken together, these studies indicate that digitalization may strengthen the alignment between construction capital expenditure, bid price reasonableness, contractor capability, and construction quality.

Discussion

Main Research Pattern

The main pattern emerging from the reviewed literature is that construction quality is shaped by an integrated fiscal–procurement–implementation chain rather than by budget allocation alone. Construction capital expenditure provides the fiscal input, but its effect depends on whether the budget is realistic, risk-sensitive, and aligned with project quality requirements (Abdelalim et al., 2025; Aldossari, 2025; Artopo et al., 2025; Dewata et al., 2022; Li & Li, 2022; Liu et al., 2019; J. Yang et al., 2024). Bid price then translates fiscal input into contractor cost structure, implementation commitment, and resource mobilisation. Studies on bid price formation and low-bid risks show that irrational bid prices may reduce the contractor's ability to maintain material quality, skilled labour, supervision, safety, and quality assurance (Adianto et al., 2022; Arifin & Arviansyah, 2024; Dewi & Susetyo, 2022; Gede et al., 2023; Ly, 2023; Maqfirah et al., 2025; Oyeyipo et al., 2016; Subrata et al., 2020).

A second pattern is that contractor capability conditions the relationship between bid price and construction quality. Contractor performance studies show that technical competence, financial strength, stakeholder management, contract functions, multi-criteria assessment, and non-price indicators determine whether bid prices can be transformed into reliable project outcomes (Alfalah et al., 2024; Alkilani & Loosemore, 2024; Bachtiar et al., 2022; Gunasekara et al., 2021; Jasim, 2021; Mahadik & Topkar, 2023; Matto, 2025; M. Yang et al., 2025). Contractor performance is shaped not only by price and technical capacity, but also by risk management strategies, contract functions, sustainability orientation, and contextual disruptions such as the Covid-19 pandemic (James et al., 2025; Sabri et al., 2021; Syaferi et al., 2021). This means that even a seemingly reasonable bid price may not produce high construction quality when contractor capability, contract governance, or project control is weak. A third pattern is the growing importance of digital cost–quality governance. BIM, BIM 5D, digital twin, AI-based budgeting, explainable machine learning, and adaptive resource-flow control can improve cost estimation, tender transparency, cash-flow management, bidder prediction, and project monitoring (Gharaibeh et al., 2024; C. Jiang et al., 2023; Oo et al., 2025; Sadick et al., 2025; Santoso et al., 2023; Shan et al., 2024). These studies suggest that digitalization does not replace fiscal planning or contractor capability, but it can strengthen the alignment among construction capital expenditure, bid price reasonableness, implementation capability, and construction quality.

Theoretical Contribution and Novelty

This review contributes theoretically by integrating three streams of research that have largely developed separately: public fiscal management, construction procurement, and construction quality management. Public Fiscal Theory explains construction capital expenditure as a fiscal input intended to generate public value; the Cost-Based Pricing Perspective explains bid price as a cost-based and behaviour-based response to tender requirements; and the Resource-Based View explains construction quality as the result of effective resource mobilisation by capable contractors. When brought together, these perspectives form an input–mechanism–impact framework in which construction capital expenditure functions as the input, bid price functions as the mediating mechanism, contractor capability, contract functions, risk management, and digital governance function as implementation conditions, and construction quality functions as the impact.

This framework extends previous literature by shifting the discussion away from a direct budget–quality relationship toward an indirect fiscal–procurement–quality pathway. In this pathway, construction quality is not assumed to result automatically from higher construction capital expenditure. Instead, quality depends on how construction capital expenditure is translated into cost estimation accuracy, rational bid prices, contractor resource allocation, contract governance, risk management, and project control. This conceptualization offers a clearer theoretical basis for future empirical studies seeking to test the mediating role of bid price using project-level public construction data.

The primary novelty of this review lies in the explicit development of a fiscal–procurement–quality nexus framework. Although previous studies have examined construction capital expenditure, bid price, contractor performance, risk management, contract functions, and construction quality, they have generally done so in separate analytical streams. This review brings those streams into one integrated explanation and positions bid price as a conceptual mediating mechanism linking public fiscal allocation to construction quality outcomes. It also extends the framework by incorporating contractor capability, contract functions, risk management, and digital cost–quality governance as implementation conditions that may strengthen or weaken the pathway from construction capital expenditure to quality.

Practical Implication

The findings provide several practical implications for public construction governance. First, public agencies should align construction capital expenditure planning with project complexity, market prices, risk contingencies, safety needs, and measurable quality indicators (Alba-Rodríguez et al., 2025; Artopo et al., 2025; Farshadnia et al., 2018; K. Yang et al., 2021). Second, procurement evaluation should not rely solely on the lowest bid, because low bid prices may generate hidden risks for quality and long-term project sustainability (Arifin & Arviansyah, 2024; Dewi & Susetyo, 2022; Gede et al., 2023; Subrata et al., 2020). Third, bid price reasonableness should be assessed through cost realism, alignment with owner estimates, risk allowance, and technical–financial feasibility (Adianto et al., 2022; Iyer et al., 2023; Johantri et al., 2021; Maqfirah et al., 2025). Fourth, contractor selection should incorporate non-price indicators such as experience, financial capacity, technical competence, contract performance, quality control systems, risk management capability, and stakeholder management capability (Alfalah et al., 2024; Alkilani & Loosemore, 2024; Gunasekara et al., 2021; Jasim, 2021; Mahadik & Topkar, 2023; Matto, 2025; M. Yang et al., 2025). Broader

managerial and organizational studies also imply that value-based procurement should consider governance quality, managerial capacity, workforce competence, and strategic adaptability in responding to project risks (Farhanah & Susilawati, 2022; Widyaningsih et al., 2020). In public construction projects, this means that procurement quality cannot be secured by technical evaluation and price comparison alone. Fifth, digital cost and quality governance should be strengthened through BIM 5D, digital twin, e-tendering, AI-based budgeting, and data-driven project monitoring (Gharaibeh et al., 2024; Oo et al., 2025; Sadick et al., 2025; Santoso et al., 2023; Shan et al., 2024). These tools can improve transparency, estimation accuracy, project monitoring, and early risk detection. In practice, this suggests that public construction quality improvement requires a governance system that integrates fiscal realism, procurement rationality, contractor capability, and digital oversight.

Research Gap

This review identifies several important research gaps. First, few studies explicitly test bid price as a mediating mechanism between construction capital expenditure and construction quality. Existing studies tend to examine construction capital expenditure, bidding behaviour, contractor performance, contract functions, risk management, and construction quality separately, rather than as part of one connected pathway (Abdelalim et al., 2025; Arifin & Arviansyah, 2024; Gunasekara et al., 2021; Haiyirete et al., 2025; James et al., 2025; M. Yang et al., 2025).

Second, studies on low-bid practices often identify procurement risk but do not sufficiently explain the operational pathway through which low bid prices affect material quality, labour allocation, supervision, safety, and defect risk (Gede et al., 2023; Ly, 2023; Subrata et al., 2020). Third, empirical studies in emerging economies remain limited, especially those using project-level public infrastructure data. Existing Indonesian studies discuss construction capital expenditure allocation, owner estimates, low bids, contractor qualification, construction bid prices during the pandemic, contract change orders, and BIM 5D, but these streams have not yet been integrated into a single empirical mediation model (Bachtiar et al., 2022; Dewi & Susetyo, 2022; Hidayat, 2024; Johantri et al., 2021; Kasdy et al., 2019; Rahmat et al., 2020; Santoso et al., 2023; Syaferi et al., 2021). Fourth, digital tools are increasingly discussed, but few studies connect digital cost control directly with bid price evaluation and construction quality assurance (Gharaibeh et al., 2024; C. Jiang et al., 2023; Oo et al., 2025; Sadick et al., 2025; Shan et al., 2024).

Although recent studies have examined contractor performance, contract functions, and risk management strategies, limited research has connected these factors to a mediation model linking construction capital expenditure, bid price, and construction quality. Future research therefore needs to examine whether contractor performance, contract functions, and risk management capability strengthen or weaken the indirect effect of construction capital expenditure on quality through bid price.

Future Research Agenda

Future research should empirically test the proposed mediation model using project-level public construction data. Quantitative approaches such as SEM-PLS, regression-based mediation analysis, panel regression, or multilevel modelling may be used to examine whether construction capital expenditure affects construction quality directly or indirectly through bid price reasonableness. Relevant variables may include construction capital

expenditure, owner estimate, bid price, contract value, change orders, project duration, cost overrun, quality inspection results, defect records, contractor qualification, risk management capability, contract function effectiveness, digitalization maturity, and public supervision intensity.

Future empirical studies may also adopt risk-based and financial modelling approaches to strengthen the analysis of fiscal allocation, bid price, and construction quality. Nurhakim et al. (2024), for example, demonstrate the use of portfolio-based financial modelling to evaluate risk–return decisions. Although the study is not directly designed for construction quality analysis, its risk-based logic may inspire future work on how public agencies allocate construction capital expenditure under uncertainty and how that allocation affects bid price reasonableness, contractor financial capacity, and project performance.

Future studies should also test moderation effects. Contractor capability may moderate the relationship between bid price and construction quality because contractor performance depends on technical competence, financial strength, contract functions, risk management, and resource mobilisation capability (Alfalah et al., 2024; Gunasekara et al., 2021; Jasim, 2021; Mahadik & Topkar, 2023; Matto, 2025; M. Yang et al., 2025). Digitalization maturity may also moderate the relationship between construction capital expenditure and bid price reasonableness because digital tools can improve cost estimation, transparency, and project monitoring (Gharaibeh et al., 2024; Oo et al., 2025; Sadick et al., 2025; Shan et al., 2024). Comparative studies across regions, ministries, and local governments would also provide stronger evidence on how fiscal governance and procurement behaviour shape construction quality in Indonesia and other emerging economies.

Proposed Conceptual Framework

Based on the synthesis, this study proposes a fiscal–procurement–quality framework in the form of an input–mechanism–impact model. Construction capital expenditure functions as the input because it provides the financial foundation for project planning, technical specifications, cost estimation, risk allocation, safety budgeting, supervision, and quality assurance. In this stage, the realism of construction capital expenditure and the quality of owner estimates determine whether the procurement process begins with a sound financial basis.

Bid price reasonableness functions as the mechanism that translates fiscal allocation into procurement outcomes. A reasonable bid price reflects cost realism, risk allowance, market conditions, technical feasibility, and the contractor’s capacity to implement the project without sacrificing quality. In contrast, an irrationally low bid price may create implementation pressure that weakens material quality, labour quality, supervision, safety provision, and quality control during project execution.

Construction quality functions as the impact because it represents the final outcome of the interaction between fiscal planning and procurement behaviour. This outcome is reflected in technical compliance, material reliability, workmanship quality, safety, durability, functionality, and quality-risk control. Accordingly, the framework explains that construction capital expenditure does not automatically improve construction quality; its effect depends on whether procurement systems generate rational bid prices and whether contractors can convert financial resources into quality construction outputs.

Between the mechanism and the impact, this study places several implementation conditions that shape the effectiveness of the relationship. These include contractor capability,

contractor resource allocation, contract functions, risk management, project control, and digital cost–quality governance. These conditions help explain why similar levels of construction capital expenditure and similar bid prices may still produce different quality outcomes across projects.

The framework also incorporates several moderating factors, namely procurement regulation, lowest-bid policy, project complexity, risk allocation structure, contract-function effectiveness, digitalization maturity, and public supervision intensity. These factors may strengthen or weaken the relationship between bid price reasonableness and construction quality. Therefore, the proposed conceptual model extends the conventional budget–quality view by showing that public construction quality is produced through a broader fiscal–procurement–implementation pathway rather than through budget size alone.

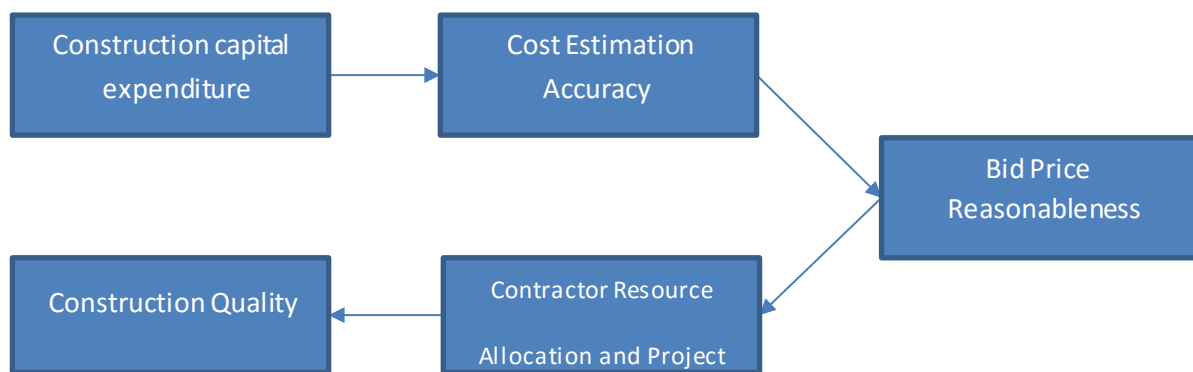


Figure 3. Conceptual Framework

Figure 3 presents the proposed fiscal–procurement–quality framework developed from the literature synthesis. The framework positions construction capital expenditure as the input, bid price reasonableness as the mediating procurement mechanism, and construction quality as the final impact. Contractor capability, resource allocation, contract functions, risk management, project control, and digital cost–quality governance act as implementation conditions that influence whether fiscal allocation can be translated into quality outcomes. In addition, procurement regulation, lowest-bid policy, project complexity, digitalization maturity, and public supervision intensity may moderate the relationship between bid price and construction quality. This framework explains that construction quality in public projects is not produced by budget allocation alone, but by the interaction of fiscal realism, procurement rationality, contractor capability, and governance quality.

CONCLUSION

This Systematic Literature Review synthesized 57 selected scholarly sources on construction capital expenditure, bid price, contractor performance, cost control, public procurement, risk management, contract functions, digital governance, and construction quality in public construction projects. The reviewed studies consist of 39 core synthesis sources, 11 included-with-caution sources, and 7 supporting references. The synthesis shows that construction capital expenditure plays a strategic role in shaping project outcomes, but its influence on construction quality is neither direct nor automatic.

The findings indicate that the relationship between construction capital expenditure and construction quality operates through a broader fiscal–procurement–implementation chain. Construction capital expenditure affects project outcomes through cost estimation accuracy, owner-estimate realism, bid price reasonableness, contractor capability, contract functions, risk management, resource allocation, and project control. In this review, bid price emerges as a key conceptual mechanism because it links fiscal allocation to contractor implementation capacity and, ultimately, to construction quality.

The review identifies five dominant themes: construction capital expenditure and budget governance, bid price formation and public procurement, contractor capability and performance, construction quality and quality risk, and digital cost–quality governance. Theoretically, the study contributes by integrating Public Fiscal Theory, Cost-Based Pricing Perspective, and Resource-Based View into a single fiscal–procurement–quality framework. This framework positions bid price as a conceptual mediating mechanism and extends prior literature by incorporating contractor capability, contract functions, risk management, and digital governance as critical implementation conditions.

Practically, the findings suggest that public agencies should move beyond narrow lowest-bid logic and strengthen value-based procurement, rational bid-price evaluation, contractor capability assessment, risk-based project control, contract-function governance, and digital transparency through e-tendering and BIM-based systems. Construction capital expenditure planning should also be aligned with project complexity, realistic cost estimation, measurable quality standards, and long-term infrastructure performance. In this sense, improving public construction quality requires not only more budget, but better fiscal design, better procurement decisions, and stronger implementation governance.

This study is limited by its reliance on secondary literature and conceptual synthesis rather than direct project-level empirical testing. Some reviewed references also function mainly as theoretical or contextual support rather than direct empirical evidence on the fiscal–procurement–quality relationship. Future research should therefore validate the proposed framework using project-level public construction data, including construction capital expenditure, owner estimates, bid price, contract value, change orders, project duration, inspection results, defect records, contractor capability, risk management capability, contract-function effectiveness, and digitalization maturity. Such empirical testing is necessary to determine whether bid price significantly mediates the relationship between construction capital expenditure and construction quality, particularly in Indonesia and other emerging economies.

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