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Infrastructure Financing: Trends, Challenges, and Future Directions

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ABSTRACT

Purpose: Infrastructure financing is critical for global development, yet it remains constrained by challenges such as funding deficits, regulatory complexities, and the need for sustainable and technologically driven solutions. The review aims to explore trends, challenges, and future directions in infrastructure financing, providing a comprehensive synthesis of current knowledge and identifying gaps for further research.

Methodology: This systematic literature review (SLR) adopts the PSALSAR methodology—Protocol development, Search, Appraisal, Literature synthesis, Analysis, and Report writing—to analyse 72 peer-reviewed studies published between 2014 and 2024.

Findings: A structured search across academic databases yielded relevant literature, which was rigorously appraised against predefined inclusion criteria. The thematic analysis revealed key trends, including the growing reliance on public-private partnerships (PPPs), the integration of digital technologies like fintech and blockchain, and the emergence of green financing instruments such as green bonds and Islamic bonds. Key challenges identified include inadequate risk-sharing mechanisms, regulatory inconsistencies, and socio-political uncertainties. Also, 75% of the studies on infrastructure financing are dominated by articles from developing countries. This SLR recognizes knowledge gaps in relation to the context, theory and content for future research.

Originality/value: This paper is original

Paper type: a Research Paper

Keyword: *Public Private Partnership, Infrastructure Fund, Sukuk*

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I. INTRODUCTION

Infrastructure is the backbone of economic development and societal well-being (Adeoye and Islam, 2019). Adekoya (2024), Garg et al. (2024), Berawi et al. (2023) and Amaliah and Aspiranti (2022) noted that infrastructure development encompasses a wide range of physical systems, including transportation networks, energy production and distribution, water supply, and sanitation, among others. Effective and sustainable infrastructure is crucial for enhancing productivity, ensuring public health, and improving the quality of life. Infrastructure projects typically involve huge investments, long incubation and gestation periods, and/or complex coordination among various stakeholders, making their financing a critical area of study and practice (Fatai et al., 2016; Haran et al., 2019).

Over the past decades, a wide range of research articles has been released on the demand for infrastructure development driven by rapid urbanization, population growth, and technological advancements (Ferrari et al., 2016; Tian et al., 2020; Chigora et al., 2021; Ehizuelen, 2021; Irwanto et al., 2023). Rural-urban migration has resulted on the later experiencing unprecedented population growth, placing immense pressure on existing infrastructure and necessitating new investments. According to the Global Infrastructure Outlook, there is an estimated global infrastructure investment gap of $14.9 trillion by 2040, with 75% of this gap attributable to road and electricity. This gap highlights the pressing need for innovative and effective financing solutions to meet the

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growing demands and solve the financing constraints (Anago, 2023; Hameiri & Jones, 2023; Kukah et al., 2022; Santiago et al., 2021).

Traditional public financing methods are often insufficient to cover the immense costs associated with these projects, necessitating the exploration of alternative financing mechanisms such as public-private partnerships (PPPs), Islamic bonds, climate or green finance, private investments, and new financial instruments (Chukwu & Dada, 2023; Amaliah & Aspiranti, 2022; Chu & Muneeza, 2019).

Public sector entities have historically played a dominant role in financing infrastructure projects, primarily through budget allocations and debt financing. However, fiscal constraints and competing priorities have limited their capacity to fully address infrastructure needs (Owusu-Manu et al., 2015). This has led to a growing recognition of the role that private sector participation can play in bridging the financing gap (Branchoux et al.,2018; Haran et al., 2019). Public-private partnerships (PPPs) have emerged as a popular model, leveraging the strengths of both sectors to deliver infrastructure projects more efficiently and effectively. Additionally, private equity, infrastructure funds, and institutional investors are increasingly being tapped to finance large-scale infrastructure projects (Irwanto et al., 2023; Berawi et al., 2021; Chotia & Rao, 2018).

Despite the potential benefits of private sector involvement, infrastructure financing remains fraught with challenges. Financial challenges, such as funding gaps, cost overruns, and project delays, are common (Adeoye & Islam, 2019; Santiago et al., 2020; Hameiri & Jones, 2023). Political and regulatory challenges, including policy uncertainty, regulatory complexity, and corruption, can also impede infrastructure development. Furthermore, environmental and social considerations, such as land acquisition, community opposition, and environmental impact assessments, add layers of complexity to infrastructure financing. Effective risk management and mitigation strategies are crucial to address these challenges and ensure the successful delivery of infrastructure projects.

The advent of artificial intelligent technologies has further transformed the landscape of infrastructure financing. Financial technologies (fintech) and digital innovations, such as blockchain and smart contracts, have the potential to streamline financing processes, enhance transparency, efficiency, and reduce transaction costs (Wu et al., 2021; Tian et al., 2020). The concept of smart infrastructure, which integrates digital technologies into physical infrastructure, is also gaining traction. These advancements can improve the efficiency, sustainability, and resilience of infrastructure systems, but they also raise new questions about financing mechanisms and regulatory frameworks.

Therefore, it is pertinent to synthesize existing knowledge, identify key trends, and uncover gaps in research as regarding infrastructure financing. The objective of this systematic literature review (SLR) is to provide a comprehensive and critical analysis of the existing body of knowledge on infrastructure financing. By systematically reviewing and synthesizing the literature, this article aims to identify key trends, challenges, and emerging practices in the field. Additionally, this review seeks to uncover gaps in the current research and propose directions for future studies.

To achieve these objectives, the review addresses the following research questions:

1. What are the current trends and emerging practices in infrastructure financing?
2. How do technological advancements influence infrastructure financing?
3. What the different financing models?
4. What are the existing gaps in the literature, and what future research directions can be identified?

To these ends, we presented the SLR of 72 journals articles published between 2015 and 2024. Our review is organized as follows: section 2 explains the research methodology, that is, the database search methods and identified journals analysis. Then section 3 presents the results in relation to the theme, sectorial analysis, continent and country as well as time analysis of journals reviewed. After that, directions for further studies opportunities suggested.

II. METHODS

This SLR is based on the work of Mengist *et al.* (2020) using the environmental science research strategy to SLR. This progressive research produces an unbiased process to identifying, synthesizing and analysing scholarly articles by conducting a thorough web search of databases in order to aggregate scholarly knowledge from multiple sources on a specific topic. Mengist *et al*. (2020) described six basic steps of search, appraisal, synthesis, analysis and reporting results (PSALSAR) used in this research to conduct a thorough SLR which are shown in Table 1.

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Table 1: Steps in Systematic Literature Review

Step	*Application in the current study*
Research Protocol – define the research scope	*The scope of the work was defined to focus on infrastructure financing and economic development for articles published within 2014 and 2024.*
Search – identify the search strings and the database	*- Infrastructure Finance for all articles published between 2014 and 2024. The search includes "Infrastructure Financing", "Infrastructure finance", "Infrastructure finance and development", "Infrastructure finance and growth", "Infrastructure financing and development", "Infrastructure financing and development", and "infrastructure funds".* *- Database used include Google Scholar and Science Direct.*
Appraisal – criterial of inclusion and exclusion of journals	*All articles in English Language that meet the above search strings were reviewed and downloaded. However, working papers, newspaper publications, thesis, books, articles that were not accessible were excluded to provide more opportunity to review relevant journals.*
Synthesis – extract and categorised the data.	*Abstract of downloaded articles were read to understand their scope and focus to assess the relevant to this study. A read through the journal provides relevant information for this SLR. At the end of this process 72 published articles were selected and reviewed.*
Analysis – narrate the result findings	*Findings and results were analysed using both quantitative and qualitative strategies.*
Reporting Results – communicating to the public	*The study presents its results in this article. Also, agenda for future research were presented.*

Sources: Author's Review

III. RESULTS AND DISCUSSION

A. Analysis of Infrastructure Financing

The analysis of literature examined revealed the current trends in the infrastructure financing, financing gaps, drivers of infrastructure finance, challenges and impact of infrastructure financing on economic development. Majority of the articles revealed that infrastructure financing has a major role in growing the gross domestic product and sustainability of a nation (Owusu-Manu *et al*., 2015: Babatunde, 2018: Mansilla & Vassallo, 2020: Irwanto *et al.*, 2023). This section presents the insights related to the research inquiries, showcasing the features of articles review such as the publication year, continent and country of publication, theme surrounding the article, sectorial analysis of articles and methodology employed by the authors.

1. Year of Publication

Since 2014, there has been considerable interest in academic discussion around infrastructure financing. Especially, with the breakout of pandemic (COVID-19) in 2019, the need to develop infrastructure across health, water (Greer, 2020; Furlon, 2020) and sanitation surge and so also the scholarly interest, for example see Chigora et al. (2021) and Mell (2021). Figure 1 shows the growing interest in the discussion and reviewing of infrastructure financing.

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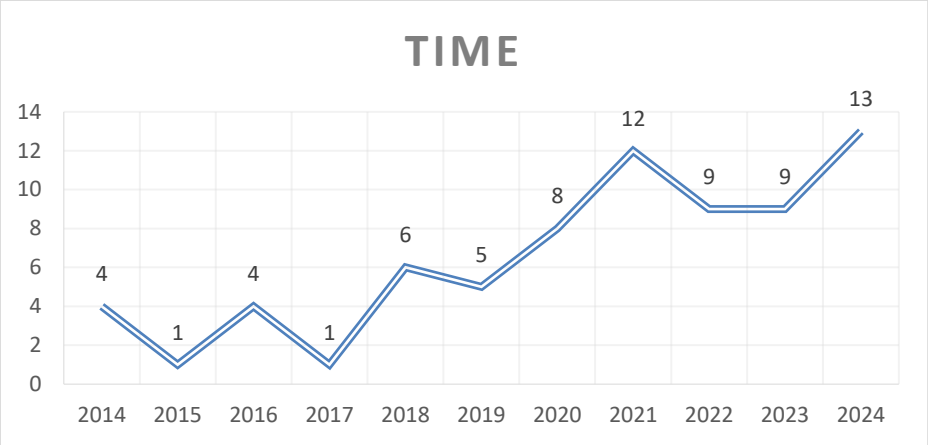

Figure 1: Publication by year

Source(s): Authors constructed

The article reviewed indicates that infrastructure financing has became front burner issue in the recent year. Notably, 71% of the research review were published within the last 5 years. The year 2024 witnessed the highest publication on infrastructure financing with 13 publications, majority of which were based on Asia's infrastructure need and ways for financing.

2. Contribution by continent/country

Figure 2 indicate the publications by continent. Asia has the highest publications with 39% (30 publications), followed by Africa (28%, 21 articles), Europe (14%, 11 articles) and North America (12%, nine articles). South America and Australasia has the least publication of three (4%) and two articles (3%) respectively.

Table 2 displays the contributions of research reviewed by country of affiliation with Indonesia with the highest contribution of 18% (13 contributors), Nigeria with 14% (10 contributors), and US, India and China with 6 contributors each (8%). The remaining authors are represented in Table 3 by 5 to 1 article. The analysis therefore shows that the articles are mostly affiliated with developing countries, suggesting that a significant interest in infrastructure financing.

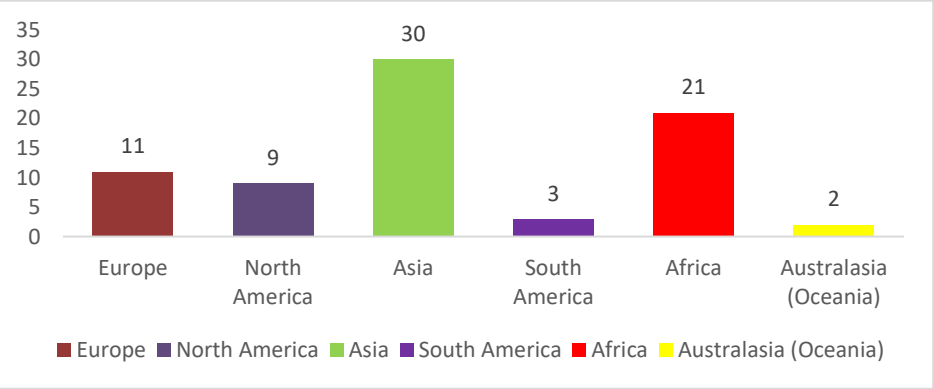

Figure 2: Publication by continent

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Table 2: Contributions by country

S/No	Country of affiliation	No of Articles	S/No	Country of affiliation	No of Articles
1	UK	5	14	China	6
2	Czech	1	15	Vietnam	1
3	Poland	2	16	Malaysia	1
4	Italy	2	17	Nigeria	10
5	Norway	1	18	Ghana	3
6	US	6	19	Chile	2
7	Canada	1	20	Egypt	1
8	Puerto Rico	1	21	Kenya	2
9	Colombia	2	22	Malawi	1
10	Kazakhstan	1	23	Zimbabwe	1
11	Indonesia	12	24	Zambia	1
12	India	6	25	Australia	2
13	Thailand	1	26	Philippines	1

Sources: Author's Review

Table 3: Contributions by country

S/No	Country of affiliation	No of Articles	S/No	Country of affiliation	No of Articles
1	UK	5	14	China	6
2	Czech	1	15	Vietnam	1
3	Poland	2	16	Malaysia	1
4	Italy	2	17	Nigeria	10
5	Norway	1	18	Ghana	3

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6	*US*	*6*	*19*	*Chile*	*2*
7	*Canada*	*1*	*20*	*Egypt*	*1*
8	*Puerto Rico*	*1*	*21*	*Kenya*	*2*
9	*Colombia*	*2*	*22*	*Malawi*	*1*
10	*Kazakhstan*	*1*	*23*	*Zimbabwe*	*1*
11	*Indonesia*	*12*	*24*	*Zambia*	*1*
12	*India*	*6*	*25*	*Australia*	*2*
13	*Thailand*	*1*	*26*	*Philippines*	*1*

Sources: Authors constructed

3. Sectorial Contributions

Figure 3 displays the sectorial focus of discussions by the authors, highlighting the scholarly interest in types of infrastructure projects by respective authors. The discussions were divided into five (5) sectors of infrastructure development, this includes: Energy, Transportations, Municipal, Housing and General (combination of any of the other sectors. From the Figure 3, it can be seen that majority (59%, 43 authors) of the articles' focus were on all infrastructure financing. This is followed in distant 21% (15 authors) by transportation sector this includes road (Fuentes et al., 2022; Fauzan et al., 2023), rail (Assab, 2024), and water transport (Santiago et al., 2020). Municipal sector which includes water, waste and sanitation, health and school followed closely with contribution of 12% (9 authors) and Housing and Energy both contributed 4% (3 articles) each.

Stemming from the sectorial analysis of the infrastructure financing article review, is the distribution by article theme. This analysis involves the examination of the common variables used by the authors which are the subject of their research.

Figure 4 illustrate the themes extracted from the analysis based on the focus or variables of discussion by the authors. The articles were reviewed and allocated under seven themes; this includes: 1). Critical factors/risk profile, 2) funding (types/gaps/needs), 3) Public-private partnership (PPP), 4) financing allocation constraint, 5) infrastructure financing, 6) economic development and sustainability, and 7) others issue (AI, taxes, legal).

Infrastructure funding top the agenda in the discussion of the articles reviewed with 33 authors (28%) (see for example Chotia and Rao (2018), Tian et al. (2020), Assab (2024)), followed by infrastructure financing theme with 26 authors (22%). PPP (12%) and economic development and sustainability comes in distant third with 14 authors each. Other discussions around artificial intelligent, taxes and legal issues in infrastructure financing have 13 authors (11%), while financing allocation constraint have 11 authors (9%) from the articles reviewed. The least is the critical factor and risk profile theme with nine authors (8%).

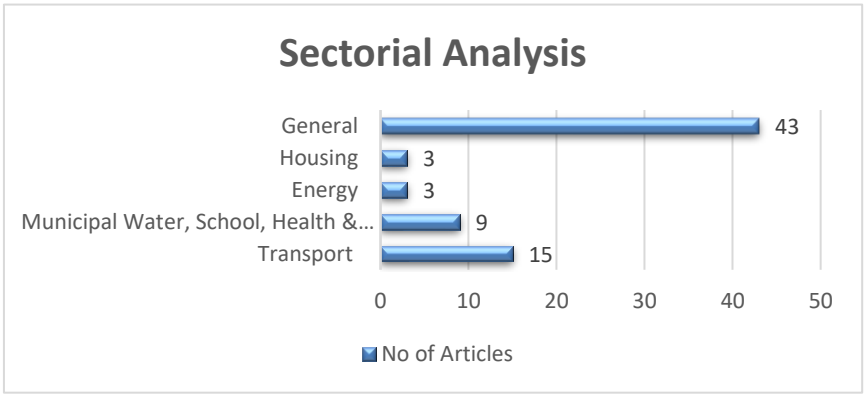

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Figure 3: Sectorial Analysis

Source: Authors constructed

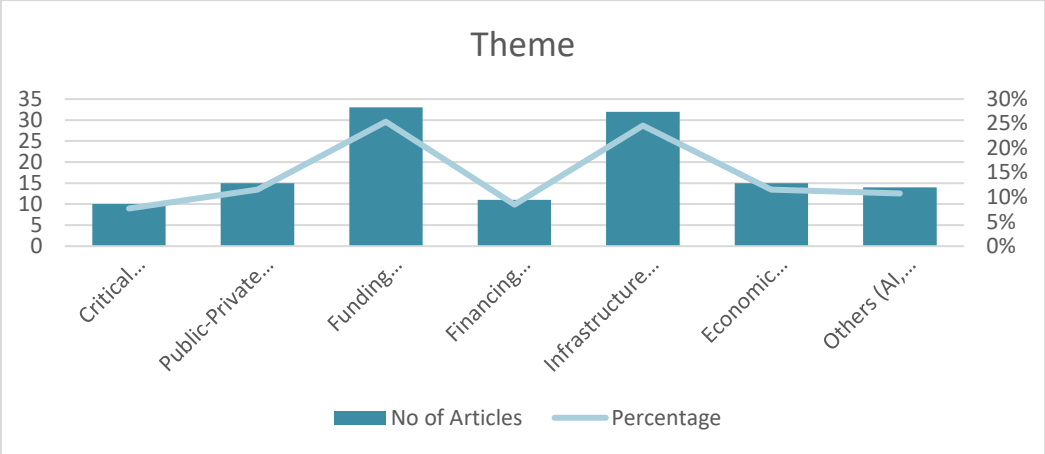

Figure 4: Contribution by theme

Source: Authors constructed

From the analysis, infrastructure funding – gaps, needs and type has been in the front burner for scholars to discern. The traditional funding mechanisms of raising taxes, road toll, congestion charges and fiscal measuring were discussed see for example Rizzi (2014); El-Nagdy *et al.* (2018); Waristi and Akbar (2018); Furlong (2020) and Fauzan *et al.* (2023). While Tian *et al.* (2020) – tokenisation; Zimmerman *et al.* (2019) – grants; Dubas-Jakóbczyk and Koziet (2022) and Berawi *et al.* (2023) – specific infrastructure; and Adeoye and Islam (2019), Irwanto et al. (2023) – Public Private Partnership (PPP) funds were analysed as the modern infrastructure funding schemes.

Li *et al*. (2017) and Irwanto *et al.* (2023) analysed the use of credit bond and credit default swap in infrastructure financing under a PPP arrangement and concluded that the project bond arrangement is beneficial in infrastructure financing. The credit bond comes with low interest rate and longer maturity period guaranteed by the government to make the project attractive to institutional investors. In their own assessment, Liang and Dong (2019) also concluded that structured bond helps investors in earning management, especially in real estate and specific infrastructure funds. Although Furlong (2020) associated a debt trap to some of the projects financed with debt, which create more problems as the debt burden increases, inability to execute infrastructure projects for community development become issue.

Fateye *et al*. (2021) examined a different approach to infrastructure funding through a community-based approach by contribution of levy/fees by the community through a community development association. This approach helps in reducing the effect of basic infrastructure decay. Another type of funding evaluated is the Sukuk bond, through the Islamic funding approach (Amaliah and Aspiranti, 2022; Rahmayati and Nasution, 2018; Adekoya, 2024). The author noted that Sukuk has been used by both Muslim and non-Muslim countries to solve infrastructure development issues. The authors recommended that government should replace Sukuk with debt (especially foreign loans). Other Islamic funding evaluated by Chu and Muneeza (2019) were Murabahah (debt-based), Mudarabah (partnership-based), Istisna (debt-based) and Wakalah (based on service).

4. Contributions by methodology employed

The articles reviewed revealed that qualitative, quantitative and mixed method were employed by the authors. Figure 5 illustrate that 30 (45%) articles used quantitative method, 24 (36%) articles used qualitative methods and 13 (19%) employed the mixed method approach.

Mode of data collections of the articles reviewed is analysed in Figure 6. Authors use more of secondary data collection method (23, 38%), while primary data collection were employed by 19 (31%) authors. Model development to collect data were employed by 12 (20%) journal articles, while seven (11%) were case study.

Figure 7 illustrate whether the article is empirical or conceptual in nature. Majority of the articles reviewed are empirical in nature with 57 (76%) of the articles. Conversely, 18 (24%) of the articles are conceptual in nature. This depict that the authors were more of evaluating existing theories as against developing new model.

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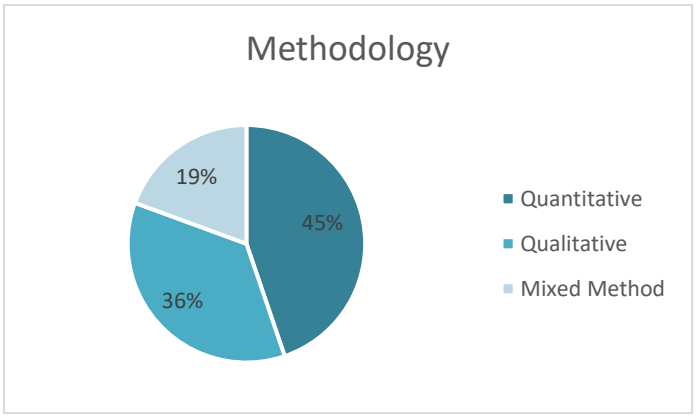

Figure 5 – Methodology employed

Sources: authors constructed

Figure 6: Data collection method

Sources: authors constructed

Although majority of the author did not employ any theory in their scholarly discussion, among theory used are Game theory (Fuentes *et al.*, 2020); Pecking Order Theory (Owusu-Manu et al., 2015) – discussing the allocation of infrastructure funding; Credit risk modeling theory (Li *et al*., 2017) – for credit default swap in road infrastructure; Agency Theory (Solheim-Kile *et al*., 2019 and Anago, 2023). Others are Stakeholders theory (Isabella and Fredrick, 2021 and Amin *et al*., 2022); Habitus Theory (Meliawati *et al.*, 2022); Theory of Infrastructure (Adekoya, 2024); Sacrifice Theory (Chukwu and Dada, 2023) and Gramscian state theory (Hameiri and Jones, 2023).

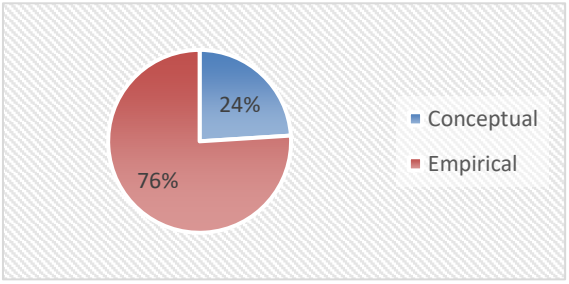

Figure 7: Empirical vs Conceptual

Sources: authors constructed

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B. Infrastructure Financing Models

Table 4 below provides information on the infrastructure financing models noted from the reviewed articles. There is a progressive movement from traditional financing system to innovative financing solutions.

Table 4: Traditional and Innovative Infrastructure Financing

Traditional	
Government Allocations	*these are derived primarily from taxes paid by citizen, government bond, government guarantee and tolls. (Rizzi, 2014; El-Nagdy et al., 2018; Chukwu & Dada, 2023; Fauzan et al., 2023)*
Grant and Loans from Multilateral Institutions	*development institution such as World Bank, International Monetary Fund (IMF), African Development Bank (AfDB) brings in technical expertise and guarantee to act. (Liang & Dong, 2019; Owusu-Manu et al., 2015)*
Community Levy	*contribution by the community to develop necessary infrastructure (Fateye et al., 2021)*
Innovative Financing model for sustainability	
Public-Private Partnerships	*PPPs is long-term infrastructure financing model between a private investors and public government of a nation for providing a public infrastructure development, where the private investors assume significant risk and management responsibility, and remuneration is performance-based. Adeoye & Islam (2019), Berawi et al. (2021), Irwanto et al. (2023) and Endo et al. (2024)*
Green Bonds and Sustainable Finance	*These are debt instruments used to raise capital specifically for projects that have positive environmental or climate benefits, such as renewable energy, clean transportation, or afforestation. Mell & Whitten (2021), Klimek et al. (2024), Cahyo et al. (2024).*
Infrastructure Investment Funds (IIFs)	*IIFs pool capital from institutional investors – including pension funds, insurance companies, and sovereign wealth funds – to finance infrastructure projects. These funds are tailored to align with the long-term nature of infrastructure investments. Christian & Wobiaraeri (2016), Liang & Dong (2019), Anago (2021), Berawi et al. (2023)*
Islamic Bond Financing	*These are Islamic financial instrument structured to comply with Shariah law, which prohibits interest-based financing – sukuk (Adekoya, 2024; Amaliah & Aspiranti, 2022; Istisna, Mudarabah (Chu & Muneeza, 2019)*

C. Challenges in Infrastructure Financing

Infrastructure financing is a complex and multifaceted faces that involves significant challenges (Kukah *et al.*, 2022; Anago, 2023). These challenges span financial (cost overrun, inadequate budgetary allocation), political (change in government), regulatory, environmental, and social dimensions, each presenting unique obstacles to the successful planning, execution, and completion of infrastructure projects (Meliawati *et al.*, 2022; Mbaka and Mwange, 2024).

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1. Financial Challenges

Funding Gaps and Budget Constraints:

Isabella and Fredrick (2021), Meliawati et al. (2022) and Chukwu and Dada (2023) noted that the strain on public budgets that exceed the financial capacity of government to finance infrastructure projects which often require substantial capital investments. These studies noted factors that lead to these funding gaps – political will is examined to be the major issue, while poor economy and lack of quality fund management are also fundamental to closing the gap. Amaliah and Aspiranti (2022) have suggested Islamic Sukuk as funding alternative to bridge the financing gap and inadequate budgetary allocation.

Cost Overruns and Project Delays:

Cost overruns and delays are common in infrastructure projects due to their complexity, long timelines, and the involvement of multiple stakeholders especially in a public-private partnership (PPP) project (Anago, 2023). Factors such as inaccurate cost estimates, design changes, and unforeseen site conditions contribute to these challenges (Kukah et al., 2022). There is need to improve the implementation of PPP projects in Africa and prepare a mitigation against cost overruns.

2. Political and Regulatory Challenges

As part of the critical success factor of infrastructure projects especially PPP projects is the political and social-cultural issues as noted by Mbaka and Mwange (2024) and Hameiri and Jones (2023). Infrastructure projects require approvals from multiple government agencies, leading to regulatory complexity and potential delays. Policy uncertainty, such as changes in government or regulatory frameworks, can also deter investors (Adeoye and Islam, 2019). Example is the election cycle in Nigeria that impacted seriously on the delivery of a PPP arrangement on Lagos-Ibadan expressway dualization, between the Federal Government of Nigeria (FGN) and Motorway Assets Limited (MAL) (Dada and Baiyewu, 2017). The project, which was earlier awarded to Bi-Courtney Highway Services Limited has been on for more a decade with no end in sight. Change in government every election cycle impacted negatively on its delivery. Other issues stemming from the uncertainty in policy making are the corruption and governance factors. Weak governance structure impact negatively on the infrastructure financing and widened the financing gap (Mmadi, 2023).

3. Environmental and Social Challenges

Adeoye and Islam (2019) averred that initial budget for infrastructure projects may not include possible environmental factors that may hinder the success of the project which then led to cost overrun. significant environmental impacts on infrastructure projects may include habitat destruction, pollution, and increased carbon emissions (Mbaka and Mwange, 2024), hence resulting into the community not approving of the project. Ensuring sustainable development requires comprehensive environmental impact assessments and adherence to sustainability standards (Hameiri and Jones, 2023; Yoshino *et al.*, 2024).

Moreover, infrastructure projects often require land acquisition, which can lead to displacement and community opposition. Ensuring fair compensation and community engagement is crucial to mitigating these challenges (Mbaka and Mwange, 2024). A practical example will be the Lagos-Calabar Coastal Highway, a 700 kilometres road project designed to cut across nine subnational of the Federal Republic of Nigeria. The project is expected to displace some notable businesses along the road corridor. This created a major opposition from a notable business in the leisure business (Adelagun, 2024).

4. Risk Management and Mitigation

A survey conducted by the Delphi identified Risk management as one of the critical success factors (CSF) for implementing infrastructure project (Fauzan *et al*., 2023). Effective risk management is critical to addressing the financial, political, regulatory, environmental, and social challenges of infrastructure financing. This involves identifying, assessing, and allocating risks appropriately among stakeholders (Haran and Milcheva, 2020; Fauzan *et al*., 2023; Mbaka and Mwange, 2024). Mbaka and Mwange (2024) averred that there is need for appropriate risk allocation and sharing methods in order to mitigate these risk issues.

The challenges in infrastructure financing are dynamic and complex, including financial constraints, regulatory risks, governance issues, environmental impacts, and social considerations. Addressing these challenges requires a holistic approach, incorporating innovative financing mechanisms, effective policy frameworks, robust risk management strategies, and proactive stakeholder engagement.

D. Impact of Technological Advancements

One of the major challenges of infrastructural financing is the traditional method of financing. The technological advancements are changing the financing landscape and reshaping the funding mix of infrastructure finance. New technology such as blockchain, Financial Technology (fintech) solution and tokenization which introduces new level of efficiency, transparency and accountability (Tian *et al.*, 2020).

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Fintech Solutions facilitate and enhancing access to infrastructure financing, reducing associated transaction cost and improve transparent and accountability. With the advent of artificial intelligent (AI) technology in blockchain offering such benefit such as enhanced transparency, security, and efficiency. By using decentralized ledgers to record transactions, blockchain allows all parties involved in infrastructure financing to access a shared, immutable record of all financial transactions, contracts, and project milestones (Wu *et al*., 2021).

E. Discussions

The key findings from this SLR are that infrastructure financing is evolving albeit with all the noted challenges. The traditional assumption that the infrastructure development is only for the government or public sector has seen the private sector with massive investment in public infrastructure with the primary aim of economic development and profit maximization. This is due to exponential changes in the need of citizens and timely delivery of economic growth to achieve the Sustainable Development Goals (SDG) 2030.

The critical success factors (CSF) to implementing Infrastructure development in a nation has been identified to be affordability, investment decisions, commercial banks, financing costs, interest rate risk, control of cash flow, contract scope, and risk management. These are grouped into socio-cultural, economical, technological, legal, environmental and political. In a bid to mitigate these challenges and improve efficiency in infrastructure financing, countries have developed several options to infrastructure financing such as credit swap (Kukah *et al*., 2022), taxation (Chukwu and Dada, 2023), tokenization (Tian *et al.*, 2020), sukuk (Adekoya, 2024), tolling (Fauzan *et al*., 2023) and community levy/ contribution (Fateye *et al*., 2021).

Another notable finding is that much of the discussion around infrastructure funding and financing are centred around the infrastructure development in Africa and Asia. This is possibly so as the region require infrastructure development to improve the economic wellbeing of the citizens.

Our findings propose some avenue for future research in Infrastructure funding or financing. Scholars may research on the effectiveness of the new emerging trends in infrastructure financing such as the green bond, ESG-linked financing, climate financing leveraging on new technological trends. The impact of AI in transparency, accountability and efficiency with the introduction of blockchain, fintech solutions and tokenization. Research could focus on stakeholder analysis to understand how to align interests, manage conflicts, and improve project outcomes. This might include examining the impact of community involvement on financing decisions and the effectiveness of benefit-sharing models in increasing local support for projects.

Another area for future research is the comparative analysis across region on the use of smart infrastructure and technology-based financing. With the rise of digital and smart infrastructure, research could explore how emerging economies can leverage technology to close infrastructure gaps.

IV. CONCLUSION

The objective of this research was identified articles and their contribution to knowledge on infrastructure financing as it relates to economic development. This literature review has provided synopsis of the current landscape as it relates to infrastructure financing. We obtained and analysed 72 scholarly articles from database and through web search. The review and analysis revealed that majority of the articles did not support the work with theory and most articles are empirical in nature. This study has identified Asia and Africa as the region with the highest number of published articles on the subject matter, while South America and Australasia are least represented. The concept of Public Private Partnership dominated the discussion, while blockchain, green financing and community levy are upcoming issues for discussion.

This study makes contributions to the concept of infrastructure financing. We have stressed that the emergence of digital infrastructure in infrastructure development need proper harnessing and upscaling that will drive sustainable infrastructure financing with accountability and transparency. The findings in this study are relevant for all stakeholders in infrastructure development space, policy makers, technology makers, investors, development finance institutions (DFI) and vendors. Policy makers can use these findings to understand the benefits of moving from the traditional funding arrangement of infrastructure financing by incorporating artificial intelligence. Technology development company could demonstrate innovative capacity through continuously evolving in digital applications development for infrastructure financing mix.

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REFERENCES

Adekoya, A. A. (2024). Sukuk (Islamic Bond) And Infrastructure Financing in Sub-Saharan African Countries: A Systematic Literature Review of The Goals, Benefits, Challenges, And Risk Factors. *International Journal for Research Trends and Innovation (IJRTI)*, *9*(4), 324-334.

Adelagun, O. (2024, May 2). Lagos-Calabar Coastal Road: Shoreline never belonged to Landmark – Umahi. *Premium Times Nigeria.* https://www.premiumtimesng.com/news/more-news/690794-lagos-calabar-coastal-road-shoreline-never-belonged-to-landmark-umahi.html

Adeoye, O. A., & Islam, S. M. (2019). Comparing public-private partnership infrastructure financing approach in a developing and developed economy. *International Journal of Business & Economics (IJBE)*, *4*(1), 33-62.

Amaliah, I., & Aspiranti, T. (2022). Shifting the State Burden in Infrastructure Financing through the Issuance of Government Sukuk. Journal of Economics, Business, & Accountancy Ventura, 25(2), 171.

Amin, A., Ahmad, M. A. N., Sholihin, M., & Rahman, R. A. (2022). Trust in Government and Public-Private Partnership on Infrastructure Financing: Indonesian Experience. *International Journal of Academic Research in Business and Social Sciences*, *12*(10), 727-741.

Anago, J. C. (2023). Public-Private Partnerships Infrastructure Financing Model: How theoretical perspectives help explain cost-overrun in some select projects. *African Journal of Business and Economic Development, 3*(6), 40-61.

Assab, A. (2024). Theoretical Foundation for Pricing Climate-Related Loss and Damage in Infrastructure Financing. *Journal of Risk and Financial Management*, *17*(4), 133.

Babatunde, S. A. (2018). Government spending on infrastructure and economic growth in Nigeria. *Economic research-Ekonomska istraživanja*, *31*(1), 997-1014. 10.1080/1331677X.2018.1436453

Berawi, M. A., Putri, C. R., Sari, M., Salim, A. V., Saroji, G., & Miraj, P. (2021). An Infrastructure Financing Scheme For Industrial Development. *International Journal of Technology*, *12*(5), 935-945.

Berawi, M. A., Dikun, S., Bintoro, R., Sari, M., & Susilowati, S. I. (2023). Evaluating Insurance Funds as A Financing Source for Infrastructure Development: A Case Study of Indonesia. *CSID Journal of Infrastructure Development*, *6*(1), 7.

Branchoux, C., Fang, L., & Tateno, Y. (2018). Estimating infrastructure financing needs in the Asia-Pacific least developed countries, landlocked developing countries, and small island developing states. *Economies*, *6*(3), 43. **https://doi.org/10.3390/economies6030043**

Cahyo, R. D., Elvitri, E., Khaddafi, M., & Iswadi, I. (2024). Analysis of the Potential of Green Sukuk in Infrastructure Finance in Aceh Province. *PKM-P*, *8*(1), 55-64.

Chigora, F., Kapesa, T., & Svongoro, P. (2021). Revisiting nation branding: An infrastructure financing perspective in Zimbabwe. *International Journal of Financial, Accounting, and Management*, *3*(2), 179-192.

Chotia, V., & Rao, N. V. M. (2018). Infrastructure financing and economic growth in India: an empirical investigation. *Journal of Financial Management of Property and Construction*, *23*(3), 258-273. https://doi.org/10.1108/JFMPC-12-2016-0056

Christian, M., & Wobiaraeri, O. (2016). Pension fund administration and infrastructure financing in Nigeria. *British Journal of Economics, Management & Trade*, *13*(2), 1-13.

Chu, J., & Muneeza, A. (2019). Belt and road initiative and Islamic financing: The case in public private partnership infrastructure financing. *International Journal of Management and Applied Research*, *6*(1), 24-40.

Chukwu, S. E., & Dada, S. O. (2023) Tax Revenue and Health Infrastructure Financing in Nigeria. *Global Scientific and Academic Research Journal of Economics, Business and Management, 64-71*

Dada, A. & Baiyewu, L. (2017, May 11). FG plans fresh concession of Lagos-Ibadan Expressway. *Punch Newspaper*. https://punchng.com/fg-plans-fresh-concession-of-lagos-ibadan-expressway/

Dubas-Jakóbczyk, K., & Kozieł, A. (2022). European Union Structural Funds as the Source of Financing Health Care Infrastructure Investments in Poland—A Longitudinal Analysis. *Frontiers in public health*, *10*, 873433.

Ehizuelen, M. M. O. (2021). China's Infrastructure Financing and the Role of Infrastructure in Awakening African Economies. *Journal of Comparative Asian Development (JCAD)*, *18*(2), 1-25.

El-Nagdy, M., El-Borombaly, H., & Khodeir, L. (2018). Threats and root causes of using publicly owned lands as assets for urban infrastructure financing. *Alexandria engineering journal*, *57*(4), 3907-3919. https://doi.org/10.1016/j.aej.2018.10.005

Endo, K., Edelenbos, J., & Gianoli, A. (2024). Finance arrangements and governance modes toward sustainable infrastructure: the case of urban railway projects in Manila, the Philippines. *Discover Sustainability*, *5*(1), 1-25.

Fatai, O. O., Omolara, Y. J., & Taiwo, A. B. (2016). Infrastructure finance and development in Nigeria. Arabian Journal of Business and Management Review (Nigerian Chapter), 3(12), 44-54.

ISSN: 2597-4785 (ONLINE)
ISSN: 2597-4750 (PRINTED)

Fateye, T. B., Odunfa, V. O., Ibisola, A. S., & Ibuoye, A. A. (2021). Basic residential neighborhood infrastructure financing in Nigeria urban cities: Community development associations (CDAs)-based approach. *Journal of Infrastructure, Policy and Development*, *5*(1), 1242.

Fauzan, M., Kuswanto, H., & Utomo, C. (2023). Implementing Toll Road Infrastructure Financing in Indonesia: Critical Success Factors from the Perspective of Toll Road Companies. *International Journal of Financial Studies*, *11*(4), 135.

Ferrari, M., Giovannini, A., & Pompei, M. (2016). The challenge of infrastructure financing. *Oxford Review of Economic Policy*, *32*(3), 446-474. https://doi.org/10.1093/oxrep/grw017

Fuentes, R., Cantillo, V., & López-Ospina, H. (2022). A road pricing model involving social costs and infrastructure financing policies. *Applied Mathematical Modelling*, *105*, 729-750. https://doi.org/10.1016/j.apm.2022.01.013

Furlong, K. M. (2021). Full-cost recovery= debt recovery: How infrastructure financing models lead to overcapacity, debt, and disconnection. *Wiley Interdisciplinary Reviews: Water*, *8*(2), e1503. **https://doi.org/10.1002/wat2.1503**

Garg, R. K., Biswas, N., Agarwal, B., Singh, S. P., & Tripathi, R. (2024). Unlocking Economic Growth: The Transformative Role of Infrastructure Finance in India. *Economic Affairs, 69*(2), 1069-1081.

Global Infrastructure Outlook. (2017). Global Infrastructure Outlook: Infrastructure Investment Needs–50 Countries. *7 Sectors to 2040, Oxford Economics*.

Greer, R. A. (2020). A review of public water infrastructure financing in the United States. *Wiley Interdisciplinary Reviews: Water*, *7*(5), e1472.

Hameiri, S., & Jones, L. (2023). Why the West's alternative to China's international infrastructure financing is failing. *European Journal of International Relations*, 1-8. https://doi.org/10.1177/13540661231218573

Haran, M., Lo, D., & Milcheva, S. (2019). Performance drivers in private infrastructure funds. *European Real Estate Society*, eres2019_215.

Isabella, W., & Fredrick, N. (2021) Effects of Taxation on Public Infrastructure Financing in Nairobi City County, Kenya. *International Journal of Science and Research, 10*(9), 260-267 10.21275/SR21830125010

Irwanto, A., Oetomo, W., & Koespiadi, K. (2023). Analysis of Election of Infrastructure Financing Schemes in The Development of Regional Waste Management in The District And City of Probolinggo. *Asian Journal of Engineering, Social and Health*, *2*(12), 1694-1703.

Klimek, J. A., Klimek, J., Barej-Kaczmarek, E., Gębski, B., Kołodziejczak, S., & Terelak, A. (2024). Infrastructure fund as an alternative driver in the implementation of green energy policy in European countries. *Energy Reports*, *11*, 1766-1773.

Kukah, A. S., Anafo, A., Kukah, R. M. K., Blay Jnr, A. V. K., Sinsa, D. B., Asamoah, E., & Korda, D. N. (2022). Exploring innovative energy infrastructure financing in Ghana: benefits, challenges and strategies. *International Journal of Energy Sector Management*, *16*(2), 248-264.

Li, S., Abraham, D., & Cai, H. (2017). Infrastructure financing with project bond and credit default swap under public-private partnerships. *International Journal of Project Management*, *35*(3), 406-419. https://doi.org/10.1016/j.ijproman.2017.01.005

Liang, J., & Dong, Z. (2019). The impact of the stapled security structure on the quality of financial disclosure: evidence from Australian real estate investment trusts and listed infrastructure funds. *Journal of Contemporary Accounting & Economics*, *15*(2), 206-223.

Mansilla, P., & Vassallo, J. M. (2020). Innovative infrastructure fund to ensure the financial sustainability of PPP projects: The case of Chile. *Sustainability*, *12*(23), 9965.

Mbaka, R., & Mwange, A. (2024). An exploration of the key success factors of public-private partnerships as alternative social infrastructure financing strategy: The case of the health sector in Lusaka, Zambia. *International Journal of Multidisciplinary Research and Growth Evaluation, 5*(2), 138-146.

Meliawati, D., Dirgantari, N., Hariyanto, E., & Pratama, B. C. (2022). The Effect of Revenue on Capital Expenditure, Infrastructure Financing, Government Accountability Performance System and Budget Refocusing in Central Java Province During Pandemic. *International Journal of Economics, Business and Accounting Research (IJEBAR)*, *6*(4), 1779-1794.

Mell, I. (2021). 'But who's going to pay for it? Contemporary approaches to green infrastructure financing, development and governance in London, UK. *Journal of Environmental Policy & Planning*, *23*(5), 628-645.

Mell, I., & Whitten, M. (2021). Access to nature in a post Covid-19 world: Opportunities for green infrastructure financing, distribution and equitability in urban planning. *International Journal of Environmental Research and Public Health*, *18*(4), 1527. **https://doi.org/10.3390/ijerph18041527**

Mengist, W., Soromessa, T., & Legese, G. (2020). Method for conducting systematic literature review and meta-analysis for environmental science research. *MethodsX*, *7*, 1-11.

Mmadi, S. (2023). Enhancing Road Infrastructure Financing in Malawi: A Comprehensive Analysis & Recommendations. *International Journal for Multidisciplinary Research*, *5*(5), 1-20.

ISSN: 2597-4785 (ONLINE)
ISSN: 2597-4750 (PRINTED)

Owusu-Manu, D., Edwards, D. J., Badu, E., Donkor-Hyiaman, K. A., & Love, P. E. D. (2015). Real estate infrastructure financing in Ghana: Sources and constraints. *Habitat international*, *50*, 35-41. https://doi.org/10.1016/j.habitatint.2015.07.008

Rahmayati, M. E. I. (2018). Sukuk As A Model For Infrastructure Financing Published By Bumn Companies. *Kumpulan Jurnal Dosen Universitas Muhammadiyah Sumatera Utara*, *1*(1).

Rizzi, L. I. (2014). Simple model of road infrastructure financing the impact of different funding schemes. *Journal of Transport Economics and Policy (JTEP)*, *48*(1), 35-51.

Santiago, L., Barreto, M., Montañez-Acuña, A., Flecha, T., Cabrera, N., Bonano, V., & Díaz, E. (2021). A coastal vulnerability framework to guide natural infrastructure funds allocation in compressed time. *Environmental Management*, *67*, 67-80.

Solheim-Kile, E., Lædre, O., & Lohne, J. (2019). Public-private partnerships: Agency costs in the privatization of social infrastructure financing. *Project Management Journal*, *50*(2), 144-160. https://doi.org/10.1177/8756972818824908

Tian, Y., Zhang, Y., Minchin, R. E., Asutosh, A., & Kan, C. (2020, March). An innovative infrastructure financing instrument: Blockchain-based tokenization. In *Construction Research Congress 2020* (pp. 731-740). Reston, VA: American Society of Civil Engineers.

Waristi, F. V., & Akbar, R. (2018). Indonesia's Fiscal Space Expansion Strategy for Infrastructure Financing. *International Journal of Business Management and Economic Research (IJBMER)*. 9(1), 1191-1198

Wu, W., He, H., Chu, Z., Liu, Y., Shi, L., Gu, M., ... & Yang, L. (2021). Blockchain-based smart payment scheme of power infrastructure funds. *Energy Reports*, *7*, 725-733.

Yoshino, N., Abe, M., & Truong, H. T. (2024). Enhancing private infrastructure financing through capturing spillover effect: Conceptual development and an empirical case study of Vietnam's expressways. *Journal of Infrastructure, Policy and Development*, *8*(5), 3100. https://doi.org/10.24294/jipd.v8i5.3100

Zimmerman, R., Brenner, R., & Llopis Abella, J. (2019). Green infrastructure financing as an imperative to achieve green goals. *Climate*, *7*(3), 39.