
DIGITAL ORCHESTRATION OF PUBLIC INVESTMENT MANAGEMENT IN IFI-FUNDED INFRASTRUCTURE PROJECTS: AN INSTITUTIONAL AND LIFECYCLE-BASED FRAMEWORK FOR TRANSITION ECONOMIES

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Abstract

International Financial Institutions (IFIs) play a pivotal role in financing infrastructure development in transition economies. As public investment management (PIM) systems mature, the effectiveness of IFI-funded infrastructure projects increasingly depends not on the availability of financial resources, but on the quality of institutional coordination across the project life cycle. While countries such as Uzbekistan have made significant progress in formalizing project appraisal, fiscal oversight, implementation monitoring, and completion reporting, information continuity between these stages remains limited.

This article develops an institutional and analytical framework that conceptualizes digitalization in PIM not as a technical upgrade, but as an institutional coordination mechanism. It introduces the concept of **digital orchestration**, defined as a unified digital governance layer that aligns actors, procedures, and information flows across the entire project life cycle while preserving existing decision-making mandates. Using Uzbekistan as an analytical reference representative of transition economies, the study demonstrates how digital orchestration can reduce coordination and transaction costs, strengthen appraisal–implementation–evaluation linkages, and enhance portfolio-level institutional learning.

Methodologically, the paper applies qualitative institutional analysis grounded in public investment management theory, transaction cost economics, and digital governance literature. The findings contribute to the PIM literature by reframing digital platforms as governance mechanisms and by offering a scalable analytical model applicable to IFI-funded infrastructure projects in transition and developing economies.

Keywords: Public Investment Management; IFI-Funded Projects; Digital Orchestration; Institutional Coordination; Infrastructure Governance

1. Introduction

Over the past two decades, International Financial Institutions (IFIs) have become central actors in financing large-scale infrastructure projects in transition economies. Governments undergoing structural transformation increasingly rely on IFI loans and concessional financing to modernize transport networks, energy systems, water supply, and urban infrastructure while maintaining fiscal sustainability. In countries such as Uzbekistan, IFI-funded projects now represent a substantial share of public capital expenditure and play a strategic role in national development agendas.

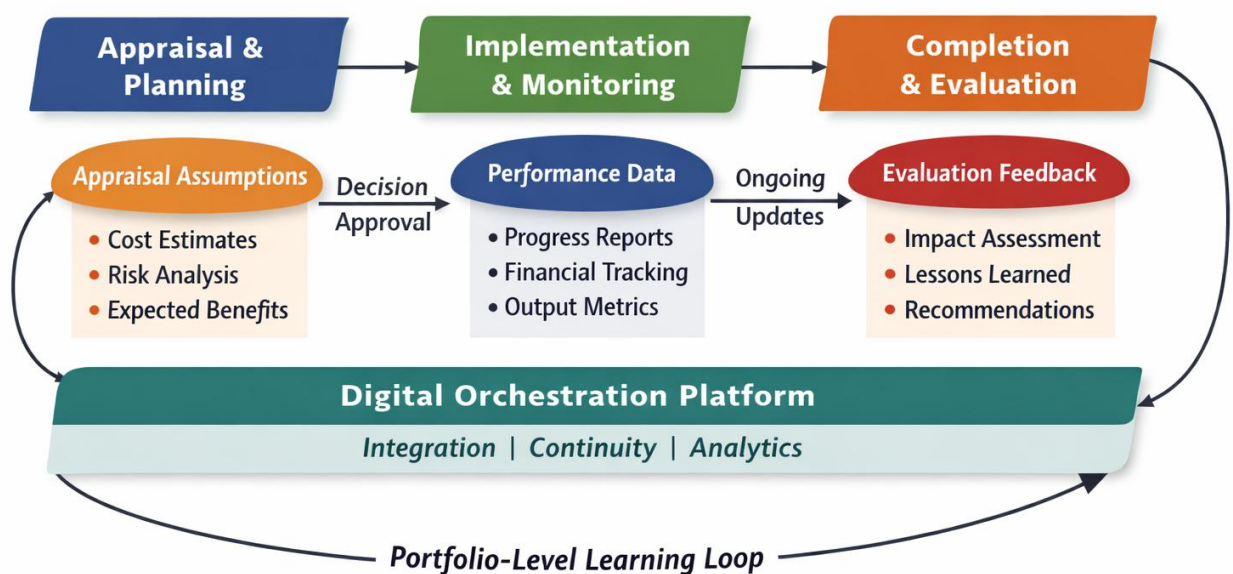
Considerable progress has been achieved in strengthening public investment management frameworks. Formal appraisal methodologies, fiscal screening mechanisms, and standardized procurement procedures have been introduced, contributing to improved discipline and transparency. As a result, the focus of investment governance is gradually shifting from basic compliance toward effectiveness, efficiency, and long-term service outcomes.

At this more advanced stage of institutional development, the key challenge is no longer access to finance but coordination across the project life cycle. Appraisal results are not always fully integrated into implementation and monitoring, and post-completion evaluations are insufficiently linked to future investment decisions. Addressing these coordination gaps represents an opportunity to further enhance the effectiveness of IFI-funded infrastructure investments.

At advanced stages of PIM development, coordination costs and information fragmentation emerge as binding constraints on infrastructure investment effectiveness. Drawing on institutional economics and digital governance perspectives, this study conceptualizes digital orchestration as a governance mechanism capable of addressing these coordination challenges.

This article proposes a digital orchestration approach to public investment management. It argues that digital platforms should be understood as institutional coordination mechanisms rather than as stand-alone information systems. By aligning national institutions and IFI requirements within a unified digital environment, digital orchestration strengthens continuity, accountability, and institutional learning across the entire project life cycle.

Figure 1. Information continuity across the public investment project life cycle.



Source: Author's own elaboration.

2. Literature Review

The literature on public investment management consistently emphasizes the importance of institutional quality in determining infrastructure outcomes. Empirical studies by the IMF and World Bank demonstrate that countries with stronger PIM institutions achieve higher economic returns from public investment, even when controlling for investment volume.

Research on IFI-funded projects highlights the dual governance challenge created by the coexistence of national procedures and donor-specific requirements. While IFI standards enhance project quality, their parallel application can increase administrative burden and weaken ownership if not fully integrated into national systems.

Transaction cost economics provides an analytical foundation for understanding these coordination challenges. Complex infrastructure projects involve multiple actors, long time horizons, and high asset specificity, making them particularly sensitive to information asymmetry and coordination costs.

Recent digital governance literature argues that digitalization should support institutional redesign rather than merely automate existing processes. However, applications of this perspective to public investment management remain limited, particularly in transition economies.

Table 1. Approaches to public investment management in the literature.

Approach	Primary focus	Governance logic	Key strengths	Main limitations
Traditional Public Investment Management (PIM)	Budget discipline and project compliance	Sequential, institution-specific procedures	Ensures fiscal control, standardized appraisal and budgeting processes	Fragmented information flows; weak linkage between appraisal, implementation, and evaluation
IFI appraisal and project cycle frameworks	Project quality, fiduciary safeguards, and risk mitigation	Parallel national and donor procedures	Improves technical rigor, procurement standards, and reporting quality	Increases coordination and transaction costs; limited integration with national systems
Digital automation tools in PIM	Process efficiency and administrative digitalization	Tool-based automation of existing procedures	Reduces processing time; improves data availability within institutions	Automates fragmentation; does not address institutional coordination or lifecycle continuity
Digital orchestration framework (this study)	Institutional coordination across the project life cycle	Integrated digital governance layer	Ensures information continuity; reduces coordination costs; supports portfolio-level learning	Requires institutional alignment and change management capacity

The table contrasts traditional public investment management practices, IFI project cycle frameworks, digital automation tools, and the proposed digital orchestration model, highlighting differences in governance logic, strengths, and limitations.

3. Methodology

This study applies a qualitative institutional-analytical methodology designed to examine coordination mechanisms in public investment management (PIM) systems involving International Financial Institutions (IFIs). Rather than evaluating individual project performance or estimating causal impacts, the research focuses on institutional arrangements, information flows, and governance interactions across the infrastructure project life cycle.

“Uzbekistan is employed as an analytical reference case representative of transition economies with expanding engagement in IFI-financed infrastructure investment and

progressively formalized PIM systems”*. The choice of Uzbekistan does not imply a single-country case study in the conventional sense. Instead, it serves as a structured empirical context through which broader institutional dynamics common to transition economies can be analytically observed.

The methodological approach integrates three complementary analytical lenses. First, public investment management theory provides a framework for examining how appraisal, budgeting, implementation, monitoring, and ex post evaluation functions are institutionally distributed. Second, institutional economics, particularly transaction cost theory, is used to analyze coordination frictions arising from fragmented mandates, parallel reporting requirements, and information asymmetries inherent in IFI-funded projects. Third, digital governance theory informs the conceptualization of digital platforms as coordination and governance instruments rather than purely technical systems.

Empirical grounding is derived from systematic document analysis of IFI project cycles, national PIM regulations, procedural guidelines, and institutional mandates governing project appraisal and implementation. This is complemented by practitioner-informed analytical interpretation, reflecting accumulated operational knowledge of IFI–government interaction in infrastructure investment processes. The methodology thus prioritizes analytical depth and institutional realism while avoiding reliance on project-level quantitative performance metrics.

4. Institutional Coordination Challenges in IFI-Funded Infrastructure Projects

As PIM systems mature, coordination challenges increasingly replace basic compliance and capacity constraints as the primary determinants of investment effectiveness. In IFI-funded infrastructure projects, these challenges stem from the coexistence of national public investment procedures and donor-specific operational requirements, each of which is rational and effective in isolation but not always fully synchronized across the project life cycle.

In the Uzbek context, recent IFI-financed projects in transport, energy, and urban infrastructure demonstrate significant progress in formal appraisal practices, fiscal screening, and procurement discipline. “Project preparation increasingly reflects standardized economic analysis, risk assessment, and fiduciary safeguards aligned with international best practice. However, institutional segmentation remains visible in the transition from appraisal to implementation and subsequent monitoring stages, a pattern also highlighted in recent assessments of public investment processes in Uzbekistan”†.

Information generated during project appraisal—such as cost-benefit assumptions, demand forecasts, and risk mitigation strategies—is not always systematically embedded into implementation monitoring frameworks. Monitoring systems, in turn, tend to prioritize financial execution and physical progress, reflecting established public financial management traditions. While this approach ensures expenditure control and delivery discipline, it limits the feedback of outcome-oriented information into ongoing project management.

Post-completion evaluation represents another critical coordination interface. IFI-funded projects typically include completion reporting and evaluation components, yet these assessments are often conducted as discrete exercises. Their analytical insights are not consistently aggregated at portfolio level or systematically linked to the design of subsequent investment proposals. As a result, institutional learning remains fragmented, even in environments where individual project evaluations are of high technical quality.

* Government of the Republic of Uzbekistan, 2020; Government of the Republic of Uzbekistan, 2021

† World Bank, 2021; Asian Development Bank, 2020

These patterns do not reflect institutional weakness but rather the natural outcome of increasingly complex governance environments. As investment volumes expand and procedural sophistication grows, coordination across institutional boundaries becomes a binding constraint. Addressing this constraint requires mechanisms capable of preserving institutional mandates while improving information continuity and strategic alignment.

5. Digital Orchestration as an Institutional Coordination Framework

The digital orchestration framework proposed in this study conceptualizes digital platforms as institutional coordination layers embedded within the PIM system. Unlike conventional digitalization approaches that automate individual procedures, digital orchestration focuses on aligning actors, processes, and information flows across the entire project life cycle.

In IFI-funded infrastructure projects, digital orchestration operates as a neutral integration mechanism between national systems and donor requirements. It does not replace existing appraisal methodologies, fiduciary controls, or monitoring responsibilities. Instead, it preserves institutional autonomy while enabling structured information continuity from project concept through implementation and post-completion evaluation.

From a transaction cost perspective, digital orchestration reduces coordination costs by minimizing duplication, lowering information asymmetry, and standardizing analytical inputs across institutions. Appraisal assumptions can be directly linked to monitoring indicators, enabling continuous comparison between projected and actual outcomes. Parallel expert reviews can be conducted within a shared digital environment, reducing procedural delays while maintaining accountability.

“Importantly, digital orchestration supports portfolio-level learning, which is consistent with the direction of ongoing public administration and digital governance reforms in Uzbekistan and with IFI engagement frameworks supporting systemic investment coordination”[‡]. By systematically aggregating post-completion evaluation data, the platform enables comparative analysis across projects, sectors, and financing modalities. This transforms evaluation from a compliance exercise into a strategic input for future investment planning. In the Uzbek context, such functionality aligns with ongoing digital public administration reforms and the increasing scale of IFI engagement.

Thus, digital orchestration represents an institutional innovation rather than a technological upgrade. Its value lies in its ability to enhance governance coherence without necessitating disruptive institutional restructuring.

6. Policy Implications for Governments and IFIs

For national governments, digital orchestration offers a pragmatic pathway to “strengthen PIM effectiveness at advanced stages of institutional development. By enhancing information continuity across the project life cycle, governments can improve fiscal risk management, align investment decisions with strategic priorities, and strengthen results-based accountability, in line with international recommendations on improving public investment efficiency and fiscal sustainability”[§]. Importantly, these gains can be achieved without altering formal decision-making hierarchies or legal mandates.

For IFIs, alignment with digitally orchestrated national systems reduces transaction costs associated with parallel reporting and supervision arrangements. It enhances transparency while reinforcing country ownership of investment processes. Moreover, digital orchestration supports results-based financing approaches by providing reliable, lifecycle-consistent data on project performance and outcomes.

[‡] World Bank, 2022; OECD, 2020

[§] IMF, 2015; World Bank, 2020

At the system level, digital orchestration facilitates a shift from project-centric oversight toward portfolio-level governance. This is particularly relevant in transition economies where investment portfolios are expanding rapidly and institutional learning becomes a critical determinant of long-term infrastructure performance.

7. Scientific Contribution and Research Results

This study yields several interrelated scientific contributions to the literature on public investment management and digital governance. First, it reframes digitalization in PIM from a technical efficiency tool to an institutional coordination mechanism. By conceptualizing digital platforms as governance layers, the study extends existing PIM frameworks to account for coordination dynamics across increasingly complex investment systems.

Second, the article advances the theoretical application of transaction cost economics to IFI-funded infrastructure governance. It demonstrates that, at advanced stages of institutional development, coordination and information continuity—rather than capital availability or procedural compliance—constitute the primary sources of efficiency gains. This insight contributes to a more nuanced understanding of why similar levels of public investment yield divergent outcomes across countries.

Third, by using Uzbekistan as an analytical reference, the study provides empirically grounded insights applicable to a broader class of transition economies. It shows how countries with strengthening PIM institutions can leverage digital orchestration to consolidate gains, enhance institutional learning, and scale investment effectiveness without institutional disruption.

Finally, the proposed digital orchestration framework offers a scalable analytical model for future empirical research. It generates testable hypotheses regarding the relationship between digital coordination mechanisms, transaction costs, and infrastructure outcomes, thereby opening new avenues for quantitative and mixed-methods investigation.

Overall, the findings underscore that the next frontier of public investment reform lies not in additional procedural layers but in the intelligent orchestration of existing institutions through digitally enabled governance mechanisms.

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