HOW PROJECT GOVERNANCE INFLUENCES SUCCESS IN INTERNATIONAL DEVELOPMENT: THE MEDIATING ROLES OF RISK AND ADAPTIVE MANAGEMENT

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Abstract: International development projects (IDPs) are crucial vehicle for human development. Their success, however, is often uncertain due to ambitious goals, diverse stakeholder involvement, and complex operational environments. While project governance is widely recognized as a crucial determinant of project success, the specific mechanisms through which it influences IDP outcomes remain insufficiently explored. To address this gap, this study aims to examine the impact of project governance on IDP success, with a focus on the mediating roles of risk management at the design phase and adaptive management during implementation. Utilizing a dataset of World Bank projects, we employ Large Language Model (LLM)-based text analysis to extract governance-related insights. Our findings reveal that quality of governance at design enhances successful project through risk management, while quality governance at implementation fosters through adaptive management. Besides, partial mediating effects indicate that there are more potential ways project governance affects IDP success. This research advances the dialog between project management and international development fields by unveiling governance mechanisms and offering practical insights for enhancing risk identification and adaptive strategies in IDPs.

Keywords: International Development Project; Project Governance; Risk Management; Adaptive Management; Large Language Model.

1. Introduction

International development and global governance have become increasingly important theoretical and practical issues, attracting attention from international organizations, governments, and academia. Projects have emerged as critical instruments for transformation in the field of international development (Freeman & Schuller, 2020; Ika et al., 2020a). International Development Projects (IDPs) aim to promote economic growth and social standards in developing countries focusing on poverty reduction, living standards, environment, protection of basic human rights, and capacity building (Youker, 2019), with a core mission to advance human development (Ahsan & Gunawan, 2010; Yalegama et al., 2016). IDPs are characterized by their intangible and complex project goals, involvement of multiple stakeholders, and cultural diversity (Kim & Nguyen, 2021). IDPs are thus known to

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be very complex and experience a high risk in accomplishing project objectives stemming from various internal, external, visible, and invisible variables (Kwak & Dewan, 2001). Poor project design, imperfect planning, and any implementation failures could threaten project outcome (Ika, 2015; Ika et al., 2012; Kilby, 2000). The ability of IDPs to fulfill their mission and advance international development has been questioned, and their inputs may far outweigh their returns (Chasanah et al., 2024; Ika et al., 2020b).

Hence, the success of IDPs has garnered significant attention from scholars. Researchers explored various factors at project and national levels that may influence or predict project outcomes (e.g., Denizer et al., 2013; Geli et al., 2014; Hassan, 2008; Kilby, 2015). The other focus on critical success factors and performance indicators of IDPs (e.g., Ika et al., 2012; Ika & Donnelly, 2017; Ortega Nieto et al., 2022; Rodríguez-Rivero et al., 2020). Among them, project governance is a decisive factor for project success (Joslin & Müller, 2016). Project governance provides the value systems, structures, processes and policies that guide project management activities to achieve the strategic and operational goals of the organization (Müller, 2009; Müller et al., 2016, 2017; PMI, 2016; Turner, 2009; Vukomanović et al., 2021), which is known as "management of project management" (Too & Weaver, 2014). While the traditional field of project management has seen a growing body of research on project governance and project success , there has been little in international development. Scholars have called for a dialog between the two fields (Heeks & Stanforth, 2014; Ika et al., 2020a, 2020b; Ika & Hodgson, 2014). On the other, scholars call for opening the black box of IDPs to explore how project management processes influence outcomes (Heeks & Stanforth, 2014; Ika et al., 2020b; Lewis et al., 2003).

Against this background, this paper aims to explore the relationship between IDPs governance and project success and the potential transmission mechanisms. According to World Bank (2023a), objectives scope, data and monitoring issues, adaptive management, and risk identification and mitigation were predominantly reported as facilitators (challenges) of project implementation in successful (unsuccessful) projects. Risk management at design is crucial since the inadequate identification and mitigation of institutional capacity risks emerged as a challenge in project implementation (World Bank, 2023b). Only ex ante risk assessment is insufficient, as counterpart capacity to implement World Bank-financed operations tends to be weaker in early phases of the project cycle. Updating of risk assessment would therefore need to be part of early course correction and adaptive management at implementation. As such, this study examined the transmission mechanism of how project governance at design and implementation impact project success through risk and adaptive management. Innovatively, based on the public project data and documents provided by World Bank, this paper further adopted Large Language Model (LLM) to verify and supplement project data, and conduct text analysis to extract and evaluate project-level risk and adaptive management.

By unravelling the underlying mechanism of how project governance influences IDPs success, this study contributes to linking project management with international development fields. In addition, we focus on project governance at both design and implementation phases, and the adoption of risk and adaptive management perspectives can provide managerial implications for practitioners that seek to delivering successful IDPs through better project preparation and supervision. Besides, this study is an innovative step to applying LLM in text analysis, especially in analyzing unstructured project documents at scale.

The rest of this paper is structured as follows. Section 2 presents hypotheses development. Section 3 details the data source, text analysis process, variables design, and model building. Section 4 shows the results of descriptive statistics, correlation, and regression analysis. Section 5 further discusses to build connection with previous literature and provide implications, as well as research limitations and opportunities for future study.

2. Hypotheses Development

2.1 Project Governance and Project Success

Project governance has neither a pure moderating nor a mediating role in the methodology – success relationship; instead, governance is an antecedent variable to project success (Joslin & Müller, 2016). In the field of traditional project management, previous studies have shown that project governance throughout the lifecycle is conducive to project success (Joslin & Müller, 2016; Young et al., 2019). In IDPs, the World Bank acts as a primary governance agency and is responsible for supervising project management including all planning and implementation activities to ensure successful delivery (Ika, 2015; Too & Weaver, 2014). The Bank institutionalizes project governance through two levers: (1) ex-ante design governance (quality at entry), ensuring alignment between project blueprints and local institutional realities, and (2) ex-post implementation governance (quality of supervision), enforcing adaptive control through dynamic monitoring. Scholars respectively analyzed how the bank performance at design and implementation influence project outcome. For example, Kilby (2015) found that sufficient project preparation significantly promotes project performance. Kilby (2000) explored the effect of supervision on project performance and concluded the more input in supervision, the better project performs. Thus, with combination of project management and international development literature, we proposed hypotheses as follows:

H1a: Quality at entry is positively associated with project success.
H1b: Quality of supervision is positively associated with project success.

Specifically, quality at entry and quality of supervision are two indicators that represent how the Bank as development agency performs in preparing and implementing projects, respectively. We use them as independent variables and give definitions later in this paper.

2.2 Role of Risk and Adaptive Management

Project environments for international development is far more complex than domestic projects, with major contextual and project environment differences existing in planning and implementation of IDPs (Kwak & Dewan, 2001). Previous studies report a significant correlation between high residual risk rates and low project success (Rodríguez-Rivero et al., 2020; World Bank, 2017). There are various risks inherent to IDPs, including implementation capacity, political, fiduciary, environmental, governance, safeguards, operational, legislation, economic, stakeholders, and market response. While these risks are inevitable, they could be better controlled with better project planning (Rodríguez-Rivero et al., 2020).

Compared with risk identification and mitigation (regarded as an ex ante concept addressed during project preparation), adaptive management can be seen as an ex post concept (World Bank, 2023b). Adaptive management can help make success possible by providing a means for solving the most complex problems, answering unanswered questions, and, in general,

reducing uncertainty (Loftin, 2014). Together with risk identification and mitigation, adaptive management is an important enabler of project implementation to facilitate successful project delivery (World Bank, 2023a). Thus, we propose hypotheses as below:

H2a: Quality at entry is positively correlated with risk management.
H2b: Quality of supervision is positively correlated with adaptive management.

In addition, project governance affects project success through a series of ways, with various mechanisms at different project stage in the lifecycle (Young et al., 2019). Risk and adaptive management play an intermediary role in relationship between project governance at design and implementation and project success, respectively. Thus, hypotheses related to mediating effect are further proposed:

H3a: Risk management is one of ways quality at entry affects project success.
H3b: Adaptive management is one of ways quality of supervision affects project success.

3. Materials and Methods

3.1 Data Source

3.1.1 Metadata

We initially obtained a dataset of 27,162[1] World Bank projects approved since the 1960s, including information on project IDs, names, recipient countries and regions, approval and closing dates, costs, sectors, and financers. These projects span 213 countries or regions and include closed, dropped, active, and pipeline projects. Due to our focus on project outcomes, we limited initial dataset to 12,660 closed projects.

Public metadata directly provided by the World Bank constitutes our original dataset. The IEG publicly released a dataset containing evaluations of all World Bank projects conducted since its establishment in the 1970s (World Bank, 2023a). The dataset provides rich project information and performance indicator.

3.1.2 Project Documents

Upon completion, World Bank projects are self-assessed by project managers through an Implementation Completion Report (ICR), evaluating the project success in achieving its development objectives. Additionally, the Independent Evaluation Group (IEG) critically verifies the ICR within 180 days by conducting Implementation Completion and Results Report Reviews (ICRR). Moreover, IEG produces Project Performance Assessment Reports (PPARs) for approximately 25% of closed projects each year. As of July 16th, 2025, the World Bank has published 8,209 ICRs, 7,436 ICRRs, and 2,647 PPARs (World Bank, 2025). These documents serve as 1) verification and supplement of project data mainly involving cost, ratings of outcome, quality at entry, and quality of supervision, and 2) sources of text analysis to evaluate project's risk and adaptive management.

[1] Accessed date: 14th January, 2025.

3.2 Text Analysis Based on Large Language Model

3.2.1 Large Language Model

LLMs are sophisticated AI systems designed for natural language processing and generation, which leverage deep learning techniques based on artificial neural networks and are trained on vast textual datasets to capture linguistic patterns, semantics, and grammar (Törnberg, 2023). They can surpass human performance in interpretive textual analysis, demonstrating greater accuracy, reduced bias, and higher reliability across languages and regions. They enable advanced text analysis, including tasks traditionally beyond computational methods, such as subjective interpretation, contextual inference, and the detection of sarcasm and irony. Given large volume and variability in document formats stemming from changes in evaluation standards, LLM approach fits the objectives of this study well. Currently, the most mainstream LLM is the GPT series, such as GPT-4, GPT-4o (Zhou et al., 2024). However, the GPT model also has many limitations, such as the speed of running, cost and verifiability. After considering these factors, GPT-4o-mini was selected for text analysis.

3.2.2 Text Analysis and Evaluation

This study used LLM in two ways. First, we used LLM to verify and supplement missing information. Through prompt engineering, we successfully extracted project IDs, original and actual costs (e.g., total costs, IBRD/IDA commitments), timelines (spanning the entire project lifecycle), and ratings (outcome, quality at entry, quality of supervision). Extracted results were manually validated and cross-checked across document types. For example, discrepancies in project cost data between ICR and ICRR documents were resolved by reviewing detailed descriptions in the respective files. We identified 9,205 projects with non-missing and valid ratings (i.e., not labelled as "Not Rated," "Not Available," or "Not Applicable"). After excluding projects with missing cost data, it results in a total of 8,648 samples.

Second, since the World Bank does not provide structured risk and adaptive management data, we employed text analysis and evaluation techniques. We first developed structured prompts and conducted small-scale tests to optimize prompt engineering. The prompt structure included three components: (1) Role and task specification, (2) Definition of target keywords, and (3) Output format and evaluation scale. Specifically, we asked the model to play a role of senior project management expert. Then, we told the model tasks by giving detailed procedures (mainly including extract evidence and assign sentiment) and defining clear scope with definitions of critical terms (here is risk management and adaptive management). Finally, we fed the model few-shot examples to help it better understand the output we needed.

The granularity of descriptions and task complexity influenced LLM performance. To ensure accuracy, we referenced definitions provided by the World Bank and risk classification frameworks. The model was instructed to extract direct evidence without modification and assess sentiment (-1 = negative, 1 = positive, 0 = neutral) with explicit justification. After excluding projects where analysis failed due to length constraints, the model successfully processed 7,886 samples.

To ensure the validity and reliability, systematic validation was conducted. Common validation methods include comparing outputs with established benchmarks, ground truth data, or expert

evaluations (Törnberg, 2023). However, due to the lack of a benchmark database for risk and adaptive management, direct comparisons were not feasible. Given the large-scale nature of project documents, token limits in LLMs and high computational costs restricted direct model-to-model comparison. Instead, stratified sampling was employed, dividing documents into four groups based on format. A 10% sample was manually reviewed by three researchers, with each researcher analyzing one-third of the samples. Extracted evidence was cross-checked with original documents, and sentiment analysis results were critically assessed. Researchers engaged in cross-validation and discussions to ensure reliability. We concluded that the model's analysis results were reasonable and reliable for regression analysis.

3.3 Variable Design

3.3.1 Dependent Variable: Outcome

Following previous literature, the Outcome rating is employed as the dependent variable to measure project success (e.g., Bulman et al., 2015; Denizer et al., 2013; Ortega Nieto et al., 2022; Raimondo, 2016). According to World Bank, the Outcome Rating refers to "*the extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently*" (World Bank, 2005). It is a composite rating based on three criteria – the relevance, efficacy, and efficiency (World Bank, 2015). The outcome rating has become a standard measure as a heuristic for project success in a growing body of literature (Ortega Nieto et al., 2022). The outcome was measured on 4-point scale in the past. Since 1995, all assessments including self-assessment (ICRs) and IEG are using 6-point outcome rating (World Bank, 2005), i.e., "Highly Satisfactory" (6), "Satisfactory" (5), "Moderately Satisfactory" (4), "Moderately Unsatisfactory" (3), "Unsatisfactory" (2), and "Highly Unsatisfactory" (1).

3.3.2 Independent Variables: Quality at Entry and Quality of Supervision

As mentioned in previous section, the World Bank plays a role of governance agency in IDPs. There are two indicators to evaluate how the Bank perform during project preparation and implementation. According to World Bank (2021), quality at entry refers to "*the extent to which the Bank identified, facilitated preparation of, and appraised the operation such that it was most likely to achieve planned development outcomes and was consistent with the Bank's fiduciary role*". Quality of supervision refers to "*the extent to which the Bank proactively identified and resolved threats to the achievement of relevant development outcomes and the Bank's fiduciary role*" (World Bank, 2021). They both are measured on 6-point scale, the same as the Outcome rating. We adopt these two as primary independent variables in this study.

3.3.3 Mediating Variables: Risk and Adaptive Management

In the World Bank IDPs, risk management refers to appropriate up-front risk analysis or mitigation actions, primarily an ex ante concept addressed during project preparation; while adaptive management facilitates project implementation by adopting timely course corrections and adaptations to unexpected shocks and circumstances (World Bank, 2023a). Through text analysis based on LLM, each project would be evaluated in terms of risk and adaptive management practices, positive (1) or negative (-1). When there are both evidence that

represent good and bad practice or when evidence is insufficient, the sentiment is prone to be neutral (0).

3.3.4 Control Variables

Based on previous studies on the effect of macro and micro factors on project outcome, common variables were added to the regression analysis to mitigate the bias caused by omitted variables (Denizer et al., 2013; Geli et al., 2014; Raimondo, 2016). So, we added controls for project characteristics to the model, including the size, duration, and sectors involved. Following Denizer et al. (2013), this study measures project size as the logarithm (in millions of USD) of the total costs including all financing source, and duration as the logarithm of the length (year[2]) from bank approval to final closing. In addition, multi-sectors projects are usually more complex, so we also measure how many sectors a project involves, i.e. higher values indicate higher dispersion of the project across sectors, and presumably also higher complexity (Denizer et al., 2013).

3.4 Model Building

For H1a and H1b, we first developed models of relationships between quality at entry and outcome, as well as between quality of supervision and outcome. Then, following the three-step method proposed by Baron and Kenny (1986) to test the mediating effects, risk and adaptive management variables were added into the latter models, and the changes of regression results were observed again to verify the mediating effects.

3.4.1 Quality at Entry, Risk Management, and Project Outcome

First, Model (1) to test the influence of quality at entry on the project outcome (H1a) is constructed:

$$Outcome_{ict} = \alpha_{10} + \alpha_{11} qae_{it} + \alpha_{12} Cost_{it} + \alpha_{13} Duration_{it} + \alpha_{14} Sector_{it} + \gamma_{1ct} + \varepsilon_{1ict}, \#(1)$$

Where the $Outcome_{ict)}$ is the outcome rating of project i in country c and year t based on the closing year, α_{10} is a constant term, γ_{1it} represents country-year fixed effect, and ε_{1it} is a residual term, and α_{11} represents the coefficient of quality at entry; α_{12}-α_{14} represent the coefficient of each project-level control variable. If α_{11} is positive and significant, then H1a would be verified; that is, quality at entry is positively correlated with project outcome.

If so, then Model (2) to test the relationship between quality at entry and risk management (H2a) is constructed:

[2] When the length is less than one year, we count the number of months to avoid a zero value.

$$rm_{ict} = \alpha_{20} + \alpha_{21} qae_{it} + \alpha_{22} Cost_{it} + \alpha_{23} Duration_{it} + \alpha_{24} Sector_{it} + \gamma_{2ct} + \varepsilon_{2ict}, \#(2)$$

Where rm_{ict} is the risk management value of project i in country c and year t, α_{20} is a constant term and ε_{2it} is a residual term, and α_{21} represents the coefficient of quality at entry; α_{22}-α_{24} represent the coefficient of each project-specific control variable. Only when α_{21} is significant, does it indicate that quality at entry can affect risk management; if not, the test would stop. In the meantime, if α_{21} is positive, then H2a would be supported, which means quality at entry is positively correlated with risk management.

Finally, the risk management variable is added and we construct Model (3) to test the mediation of risk management (H3a):

$$Outcome_{ict} = \alpha_{30} + \alpha_{31} qae_{it} + \alpha_{32} rm_{it} + \alpha_{33} Cost_{it} + \alpha_{34} Duration_{it} + \alpha_{35} Sector_{it} + \gamma_{3ct} + \varepsilon_{3ict}, \#(3)$$

If the coefficient of quality at entry α_{31} is significant and the coefficient of risk management variable α_{32} in Model (3) is significant but decreases compared to α_{11} in Model (1), it indicates that there is a partial mediation effect. If α_{32} is significant but α_{31} becomes insignificant, then there is a complete mediating effect. As such, H3a that risk management is one of the ways that quality at entry affects the project outcome would be tested.

3.4.2 Quality of Supervision, Adaptive Management, and Project Outcome

Similar to the previous section, the mediated effects model with country-year fixed effects is constructed by replacing the positions of the quality at entry and risk management variables in the previous section with quality of supervision and adaptive management, respectively:

$$Outcome_{ict} = \beta_{10} + \beta_{11} qos_{it} + \beta_{12} Cost_{it} + \beta_{13} Duration_{it} + \beta_{14} Sector_{it} + \mu_{1ct} + \epsilon_{1ict}, \#(4)$$

$$am_{ict} = \beta_{20} + \beta_{21} qos_{it} + \beta_{22} Cost_{it} + \beta_{23} Duration_{it} + \beta_{24} Sector_{it} + \mu_{2ct} + \epsilon_{2ict}, \#(5)$$

$$Outcome_{ict} = \beta_{30} + \beta_{31} qos_{it} + \beta_{32} am_{it} + \beta_{33} Cost_{it} + \beta_{34} Duration_{it} + \beta_{35} Sector_{it} + + \mu_{3ct} + \epsilon_{3ict}, \#(6)$$

Where the $Outcome_{p(i,t)}$ is the outcome rating of project i in country c and year t, β_{10}, β_{20}, and β_{30} are constant terms, μ_{1ct}, μ_{2ct}, and μ_{3ct} represent country-year fixed effect, ϵ_{1ict}, ϵ_{2ict}, and ϵ_{3ict} are residual terms, β_{11} and β_{21} represent the influence coefficient of quality of supervision on the project outcome and adaptive management, respectively; β_{12}-β_{35} are coefficients of control variables. If β_{11} is significantly positive, then H1b is supported, meaning quality of supervision is positively correlated with project outcome. The inspection procedure of mediating effect is the same as the previous section.

4. Results

4.1 Descriptive Statistics

Table 1 shows the descriptive results. There are 7307 observations without missing data. The mean outcome rating (4.159) indicates that project success is at a moderate level with some variability across projects. The mean value of quality at entry (qae) is 4.104, while the quality of supervision (qos) has a slightly higher mean of 4.424, both measured on a 6-point scale. This suggests that, on average, project governance at both design and implementation phases is rated positively, though with some variation.

The value of risk management (rm) is -0.672 on average, which is likely negative and indicates that many projects face challenges in risk identification and mitigation. Adaptive management (am) has a mean of 0.793, showing that most projects exhibit some degree of adaptability, though differences exist.

Table 1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
outcome	7307	4.159	1.125	1	6
qae	7307	4.104	1.135	1	6
qos	7307	4.424	1.006	1	6
rm	7307	-.672	.665	-1	1
am	7307	.793	.484	-1	1
log cost	7307	3.89	1.654	-3.507	11.495
log duration	7307	1.635	.67	-2.015	2.944
sector	7307	3.053	1.58	1	9

4.2 Correlation Analysis

Multicollinearity among independent variables will affect the reliability of analysis. To avoid this issue, we adopted Pearson correlation test and calculated variance inflation factor (VIF). Statistically, it is generally accepted that severe multicollinearity issue occurs only when the correlation coefficient exceeds 0.8 and VIF exceeds 10 (or more stringent threshold of 5). The results in **Table 2** show that the value of the highest correlation (between outcome and quality of supervision) is 0.677 and VIFs are all around 1. Thus, there is no concern about multicollinearity problem in regression analysis.

Table 2 Correlation Analysis with VIF

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	VIF
(1) outcome	1.000								
(2) qae	0.660 (0.000)	1.000							1.67
(3) qos	0.677 (0.000)	0.609 (0.000)	1.000						1.68
(4) rm	0.305 (0.000)	0.308 (0.000)	0.251 (0.000)	1.000					1.15
(5) am	0.403 (0.000)	0.258 (0.000)	0.341 (0.000)	0.169 (0.000)	1.000				1.15
(6) log_cost	0.100 (0.000)	0.096 (0.000)	0.090 (0.000)	0.051 (0.000)	0.078 (0.000)	1.000			1.04
(7) log_duration	-0.072 (0.000)	-0.178 (0.000)	-0.126 (0.000)	-0.188 (0.000)	0.022 (0.057)	0.081 (0.000)	1.000		1.11
(8) sector	-0.017 (0.149)	0.004 (0.715)	-0.004 (0.765)	0.003 (0.805)	0.033 (0.005)	0.099 (0.000)	-0.156 (0.000)	1.000	1.05

4.3 Regression Analysis

4.3.1 Analysis of Quality at Entry, Risk Management, and Project Outcome

During regression analysis, of the 7307 total observations, 4 singleton observations from country clusters with only one project were excluded (Correia, 2015), leaving 7303 observations for the analysis. The regression results are shown in **Table 3**. In Model (1), quality at entry has significantly positive association with the project outcome (coefficient=0.628,$p<0.01$), indicating that higher quality at entry contributes to improved project outcomes. In Model (2), quality at entry is also positively and significantly associated with risk management (coefficient=0.161, $p<0.01$), showing that quality at entry plays a role in strengthening risk management practices.

Table 3 Regression results of quality at entry, risk management, and project outcome

	Model (1) outcome	Model (2) rm	Model (3) outcome
qae	0.628***	0.161***	0.596***
	(0.0132)	(0.00865)	(0.0135)
rm	-	-	0.200***
			(0.0158)
log_cost	0.0156*	0.0184***	0.0119

	(0.00912)	(0.00544)	(0.00896)
log_duration	0.0639***	-0.129***	0.0897***
	(0.0184)	(0.0163)	(0.0176)
sector	-0.00655	-0.0146***	-0.00363
	(0.00653)	(0.00514)	(0.00637)
Constant	1.438***	-1.149***	1.668***
	(0.0739)	(0.0519)	(0.0750)
Observations	7303	7303	7303

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

When both quality at entry and risk management are included in Model (3), the coefficient for quality at entry decreases from 0.628 to 0.596 but remains statistically significant (p<0.01). Meanwhile, risk management exhibits a significant positive impact on project outcome (coefficient=0.200, p<0.01). This reduction in the coefficient of quality at entry suggests that risk management partially mediates its effect on project outcome. Thus, these results indicate that while quality at entry directly influences project outcomes, it also indirectly improves outcomes through enhanced risk management practices. Overall, H1a, H2a, and H3a are supported.

4.3.2 Analysis of Quality of Supervision, Adaptive Management, and Project Outcome

The regression results in **Table 4** support H1b, H2b, and H3b, which demonstrate the positive influence of quality of supervision and the mediating effect of adaptive management. The coefficient (0.722) and p-value (<0.01) of quality of supervision in Model (4) shows a significantly positive correlation, indicating that higher quality of supervision directly contributes to improved project outcomes. Model (5) shows that quality of supervision also has a significant positive impact on adaptive management (coefficient=0.169,p<0.01), suggesting that quality of supervision enhances the effectiveness of adaptive management practices.

Table 4 Regression results of quality of supervision, adaptive management, and project outcome

	Model (4) outcome	**Model (5) am**	**Model (6) outcome**
qos	0.722***	0.169***	0.644***
	(0.0116)	(0.00764)	(0.0123)
am	-	-	0.457***
			(0.0299)
log_cost	0.0157*	0.0182***	0.00737
	(0.00938)	(0.00419)	(0.00910)
log_duration	0.00333	0.0609***	-0.0245
	(0.0156)	(0.0104)	(0.0153)
sector	-0.00743	0.00523	-0.00982
	(0.00670)	(0.00372)	(0.00625)
Constant	0.923***	-0.142***	0.988***
	(0.0682)	(0.0428)	(0.0651)
Observations	7303	7303	7303

Standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In Model (6), both quality of supervision and adaptive management are included as independent variables to test the mediating effect. The coefficient for quality of supervision decreases from 0.722 in Model (4) to 0.644 in Model (6) but is still significant ($p<0.01$). Meanwhile, adaptive management has a significant positive impact on project outcome (coefficient=0.457, $p<0.01$). These results suggest that while quality of supervision directly improves project outcomes, it also indirectly enhances outcomes by fostering adaptive management practices. This confirms the partial mediating effect of adaptive management in the relationship between quality of supervision and project outcome.

5. Discussion and Conclusion

Motivated by increasing attention paid to project success in international development field and the insufficient exploration of project governance mechanism, this study aimed to investigate how project governance at design and implementation influence project success and unpack the underlying mechanisms from the perspective of risk and adaptive management. Our findings indicate that efficient project governance from design to implementation significantly drives project success. At design, risk management is one of key ways project governance contributes; while at implementation, adaptive management matters to make sure successful project delivery. In addition, the mediating roles of risk and adaptive management are partial, which implies that there are more potential critical factors in the relationship between project governance and project success.

5.1 Theoretical Implications

This study contributes to the existing literature in two ways. First, it provides empirical evidence on the relationship between project governance and project success in the context of IDPs. Our findings reinforce existing research in traditional project management (Joslin & Müller, 2016; Young et al., 2019), demonstrating that well-structured project governance is a crucial driver of project success. However, unlike previous studies that treat project governance as a monolithic construct, our study differentiates between governance at the design phase (risk management) and the implementation phase (adaptive management), offering a more nuanced understanding of its impact.

Second, this study helps to unpack the black box of how project governance influences project success by identifying distinct governance mechanisms across different project stages. We find that risk management plays a pivotal role in the design phase, aligning with prior research highlighting the importance of ex-ante risk mitigation (Iqbal et al., 2024). Meanwhile, at the implementation phase, adaptive management emerges as a key factor in navigating uncertainties and ensuring project continuity. Notably, our results indicate that these mediating effects are only partial, suggesting the existence of other underlying mechanisms that warrant further investigation.

Overall, this study promotes the cross-learning and dialog between two fields and respond to the call for opening black box of IDPs (Heeks & Stanforth, 2014; Ika et al., 2020b) from the governance perspective.

5.2 Managerial Implications

This study has several practical implications. In IDPs, governance agencies (e.g., World Bank) play a critical role in ensuring successful project outcomes. To enhance project performance, development organizations must focus on improving governance mechanisms at both the design and implementation phases. Specifically, risk management should be a key priority for World Bank project teams. Strengthening project teams' capacity to identify, assess, and mitigate risks at the design stage can significantly enhance project resilience. This can be achieved through conducting comprehensive ex-ante risk assessments, developing scenario-based mitigation strategies to address potential disruptions, and establishing early warning systems that allow for proactive intervention. However, risk mitigation alone is insufficient. Given the complexity of IDPs, uncertainty is an inherent challenge that cannot be entirely eliminated. Therefore, implementing adaptive management mechanisms at the project execution stage is crucial, driving projects to realize ambitious missions or at least cutting the loss when project goals are unlikely to be met.

5.3 Limitations and Future Study

This study has several limitations, which open avenues for future research. First, while we examined risk and adaptive management separately, we did not explore their interactive effects. For example, future research could investigate whether risk management at the design stage enhances or constrains the effectiveness of adaptive management during implementation. Second, while this study leveraged LLMs for text analysis, the reliability and validity of this approach remain areas of concern. The lack of a standardized benchmarking database for project governance analysis presents challenges in ensuring robust interpretation. Future studies could explore hybrid approaches that combine machine learning with expert validation to enhance analytical rigor.

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