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Enhancing water and sanitation project performance in a developing economy: Role of governance mechanisms and risk management practices

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Abstract: This paper investigates the relationship between governance mechanisms, risk management practices and performance of water and sanitation projects in Uganda. A quantitative cross-sectional survey was conducted with a sample of 66 water and sanitation projects in South-western Uganda. Data were collected using self-administered structured questionnaires and analyzed by using SmartPls Structural Equation modeling. The results revealed positive and significant relationships between the following pairs of variables: contractual governance and project performance, relational governance and risk management practices, and risk management practices and project performance. However, the hitherto hypothesized positive and significant relationships between relational governance and project performance, and contractual governance and risk management practices were not supported. Furthermore, it was established that risk management practices fully mediate in the relationship between relational governance and project performance, whereas they do not mediate between contractual governance and project performance. The fundamental contribution of this article to the project management literature is the confirmation that risk management practices act as mechanisms through which relational governance helps to maximize project performance in the context of water and sanitation projects in a developing country.

Subjects: Corporate Governance; Governance; Project Management; Risk Management for Events; Business & Planning

Keywords: contractual governance; relational governance; risk management practices; water and sanitation; project performance

1. Introduction

The fundamental role of water and sanitation has been acknowledged worldwide. The UNICEF (2019) recognizes water and sanitation as human rights and essential for life and health, dignity, empowerment and prosperity but observes that in countries like Uganda, there is poor sanitation and hygiene, as well as unequal access to safe drinking water, which culminate in diseases and deaths. Following the global target of ensuring availability and sustainable management of water

and sanitation for all in accordance with the 2030 Sustainable Development Goals (SDGs), the Ugandan water supply and sanitation sector targets 100% access to water supply and sanitation services by 2035 (African Development Bank group, 2018).

Although adequate water supply and sanitation infrastructure remain challenging for Uganda's Vision 2040 and long-term sustainable socio-economic development, the government of Uganda through the National Development Plan (NDP) earmarks scaling up water and sanitation projects as the main engine for stimulating production, especially in the agricultural, tourism and industrial sectors (African Development Bank group, 2018). Uganda prioritizes annual budgetary allocation to the Ministry of Water and environment to implement water and sanitation projects in different parts of the country (Water and environment sector performance report, 2020). For example, during the FY 2019/20, the government unveiled the National Development Plan (NDP) 2020–25, where the water and environment subsector presented 79 projects to be implemented in the NDP III at an estimated cost of UGX 13.9 trillion (Water and environment sector performance report, 2020).

Generally, recent researchers underline that the contemporary economic activity is increasingly driven through projects (Schoper et al., 2018; Young et al., 2019). It has been acknowledged that improvement in people's standards of living globally is dependent on the success of public sector projects (Young & Grant, 2015). However, over the past few years, researchers and practitioners have increasingly become concerned about the general low efficiency and poor performance in project-based organisations (Borgstein et al., 2018). Ugandan water and sanitation projects have similarly suffered performance problems. For example, it was reported that the external budget funding for the projects reduced from UGX 1,273 billion in the FY 2018/19 to 1,089 billion in 2019/20 due to delayed completion of externally financed projects, where 75% of the assessed projects did not have satisfactory performance (Water and environment sector performance report, 2020). The delayed projects were related to construction of boreholes, protected springs, piped water supply schemes, rainwater harvesting tanks, valley tanks and dams (Water and environment sector performance report, 2020).

This study therefore questions the cause of deficient performance of water and sanitation projects in Uganda and takes governance mechanisms as suspect. The paper further questions the mediating role of risk management practices in the governance mechanisms-project performance relationship. By establishing that risk management practices fully mediate in the relational governance-project performance relationship, this study contributes by addressing the gap of limited understanding of the mechanism through which governance mechanisms influence project performance, which had been identified in the project management literature (Haq et al., 2019) as well as the controversial debate on the contribution of risk management (Bakker et al., 2010; Carson et al., 2006; Guo et al., 2014; Jun et al., 2011). The study also finds that whereas contractual governance influences project performance directly, relational governance influences project performance only through risk management practices. This addresses the gap of the limited studies that examine how different governance structures influence the risk management process as well as achievement of outcomes (Guo et al., 2014).

Previous scholars have linked various governance mechanisms to project performance (Haq et al., 2019; Young et al., 2019), which has made project governance an important subject of academic debate in the project management literature (Ahola et al., 2014). Although, it is not clear as to which project governance mechanisms are effective for project success (Young et al., 2019), many scholars have emphasized the role of the dual governance mechanisms, i.e. contractual and relational governance in influencing opportunism and enhancing project performance (e.g. Lu et al., 2015; Wang et al., 2019), through acting as either substitutes or complements (Goo et al., 2009; Gustavsson & Hallin, 2014). Hence, a significant proportion of the extant literature on contract governance categorizes governance mechanisms in two approaches—transactional governance and relational governance (Maurya & Srivastava, 2020).

Some scholars have identified a gap in our understanding of how contractual and relational governance influence project performance in the presence of risk (Haq et al., 2019). Formal contracts have been shown to be effective in reducing ambiguity and uncertainty (Carson et al., 2006), but the contribution of risk management to project success is still debatable (Bakker et al., 2010; Jun et al., 2011).

Project risk management involves understanding potential problems that might occur on the project and how such problems might constrain project success (Pimchangthong & Boonjing, 2017). Researchers (e.g. Junior & Carvalho, 2013; Odimabo & Oduoza, 2018) emphasize that effective project risk management is important for project performance. However, Kutsch et al. (2012) observed that in most projects, the majority of formally identified and assessed risks remain unallocated and untreated and most firms disengage from risk management. Moreover, Guo et al. (2014) observed that there are limited studies that examine how different governance structures influence the risk management process as well as achievement of different outcomes.

Whereas there is vast research on project performance in the extant literature, there are limited studies, specifically focusing on water and sanitation projects to date. More specifically, one can hardly find such a study in the Ugandan context. Yet, Khattak et al. (2021) recently emphasized that the type and complexity of projects and their management can vary according to the industrial context in which they are implemented. Many of the recent studies have focused on the construction projects and considered antecedents such as entrepreneurial orientation (Sabahi & Mellat Parast, 2020), integrated digital delivery (Hwang et al., 2020), work–life balance with the role of organizational support and job burnout (Irfan et al., 2023), briefing clarity (Vahabi et al., 2020), team knowledge management, problem solving competence, interpersonal conflicts and organizational trust (Zhang et al., 2021).

Further, researchers have acknowledged the role of intervening variables in the governance mechanism-project performance relationship. For example, Haq et al. (2019) considered requirement risk as a mediator, while Wang et al. (2019) considered the mediating role of opportunism. This study suspects that risk management practices mediate in the governance mechanism-project performance relationship.

The rest of the paper is structured as follows: Section 2 presents the theoretical background, literature review and hypotheses development. Section 3 describes the research methodology used. Section 4 presents data analysis followed by section 5 on the discussion. Section 6 presents the conclusion and implications for theory and practice.

2. Theoretical background

This paper is grounded in the Transaction Cost Economies (TCE) theory, which is an important theoretical lens used in explaining the influence of project governance on project performance (Haq et al., 2019). Stakeholders in a project generally want to obtain the maximum benefit, which is the main cause of transaction costs (Williamson, 1979). Prior researchers suggest that contractual and relational governance can be effective in reducing transaction cost (Bstieler & Hemmert, 2015). The adaptability of contractual governance calls for drawing up alternative contracts for projects and choosing suitable contracts according to the actual circumstances to effectively reduce transaction costs and improve project performance (Luo et al., 2013). The legal enforcement of contractual governance can also decrease transaction costs (Watabaji, 2014). TCE theory emphasizes that proper governance mechanisms can control opportunism (Caniëls & Gelderman, 2010), which is a hindrance to project performance (Wang et al., 2019).

However, other scholars argue that detailed contracts can lead to a decline in trust and motivate participants to cheat (Watabaji, 2014), thereby increasing opportunism. Relational governance such as represented by trust and relationships helps to reduce the transaction cost and opportunism among transacting partners (Bstieler & Hemmert, 2015). Maurya and Srivastava (2020)

observed that it is not the specific governance mechanisms but the alignment of the governance mix with the nature of the transaction that determines contract performance. Governance fills the gaps in the express agreements of the party, reduces transaction cost (Seabright et al., 1992), influences partner opportunism, and thus determines performance outcomes of the transaction (Handley, 2017). Moreover, information asymmetries are also common in collaborative relationships, which can increase the transaction costs in inter-organizational projects (Wu et al., 2016). This therefore suggests the concurrent use of both contractual and relational governance to reduce project risks such as opportunism in order to enhance project performance.

2.1. Literature review and hypotheses development

2.1.1. Project performance

There are different definitions of the term "Project". For example, PMI (2017) considers projects to mean unique, short-term activities that lead to new products, services or outcomes. To other researchers, a project can be defined as a one-time activity with constraints involving budgets and time for delivering a unique output (Hussein et al., 2015). Several scholars have equated project performance to project success (Kagioglou et al., 2001; Lu et al., 2019), defining it in terms of accomplishments and achievements of project goals (Zaman et al., 2019). Franz et al. (2017) stressed that the common indicators of project performance can be categorized into three dimensions: the project's overall performance (time, cost and quality), the project's multiple goals (risk management, absence of conflicts, claim management) and stakeholder satisfaction.

Wu et al. (2019) emphasized that strategic yardsticks such as potential future collaboration and capability enhancement should also be considered. Zaman et al. (2019) measured the performance of information technology (IT) projects based on cost, time, quality and customer satisfaction. These measures were also adapted by Lu et al. (2019) for determining inter-organisational project performance. Wu et al. (2020) observed that the peculiarity of megaprojects requires performance evaluation criteria that take into consideration factors such as the project's life cycle and the post-delivery stages. Furthermore, Floricel et al. (2016) divided project performance indicators into the three dimensions of project completion, innovation and value creation. Recently, Wu et al. (2020) categorized the indicators of project performance into "hard elements" which include project quality, cost and schedule, and "soft elements" which include pleasant cooperation and stakeholder satisfaction. In the context of Uganda, Ahimbisibwe and Nangoli (2012) measured the performance of citizenship projects based on cost mitigation, enhanced awareness, quality and time management.

2.2. Governance mechanisms

Governance mechanisms refer to formal methods or informal relations used to control the behaviour, nourish cooperation and govern the relationship of various participants (Liu et al., 2009). Project governance provides the structure or framework that articulates the objectives of the project, the means of attaining those objectives and the means of monitoring performance (Turner, 2009). Haq et al. (2019) found that besides influencing project performance, contractual and relational governance mechanisms are useful in reducing opportunism.

Scholars (Haq et al., 2019; Maurya & Srivastava, 2020) stress that the governance mechanisms that are mainly reported in the recent literature of project management are twofold: contractual governance and relational governance. Relational governance entails the informal relationships between participants, which depend on soft and flexible methods for resolving conflicts and safeguarding against opportunism (Huber et al., 2013). It is characterized by relational attributes such as trust and relational norms (Poppo & Zenger, 2002). Hence, relational governance dimensions include trust, information exchange, solidarity and flexibility (Haq et al., 2019). Wang et al. (2019) noted that trust can be considered as a solid base for relational governance. Trust can significantly reduce transaction costs and accelerate the achievement of consensus when making decisions (Khalfan et al., 2007).

Contractual governance emphasizes the importance of formal rules based on the rights and obligations of participants that are written into a contract to prevent opportunistic behavior and improve project performance (Liu et al., 2009; Watabaji, 2014). The contractual governance mechanism includes fundamental, change management and governance dimensions (Goo et al., 2009; Haq et al., 2019). Müller et al. (2017) noted that there are a few examples of empirical research on the relationship between an effective project governance framework and project success. Gustavsson and Hallin (2014) stressed that hard project management measures alone cannot guarantee significant project performance but should complimented with the social aspect involving interactions among project employees and stakeholders.

2.2.1. Contractual governance and project performance

Several researchers have linked contractual governance to improvement in project performance. For example, Brahm and Tarziján (2015) argued that contractual governance enhances project performance by effectively allocating the project risks and aligning the enforceable standards with those of project goals. Ouchi (1979) indicated that contract governance serves as a coordination device that integrates resources and maintains cooperation to achieve valuable creations and control the behavior of project participants. Contract governance can also moderate the relationship between quality management practices and inter-organisational project performance by promoting cooperation and learning (Lu et al., 2019).

Wang et al. (2019) stressed that contractual governance has a stronger positive impact on project performance than relational governance in the early stage of the project, while relational governance exerts more positive effects on project performance than contractual governance in the middle and late stages. Through enforcement measures, one party can force another party to fulfill certain contractual obligations (Wang et al., 2019) thereby ensuring project contract performance. Furthermore, Solís-Molina et al. (2020) indicate that contractual governance is a more fundamental governance mechanism for co-exploitation projects compared to informal governance. However, Kadefors (2004) argues that contractual incentives and close monitoring of contractor performance may induce opportunism in client–contractor relationships in construction projects. This therefore leads to the following hypothesis:

H1: *Contractual governance positively and significantly relates with project performance.*

2.2.2. Relational governance and project performance

Wang et al. (2019) observed that opportunism mediates between governance mechanisms and project performance and that relational governance is more effective than contractual governance in restricting opportunism for improved project performance. Wu et al. (2020) remarked that project performance is closely related to the strength of ties between different stakeholders, whereby collaborative networks can help to achieve project delivery. Furthermore, Hossain and Wu (2009) noted that temporary projects rely not only on formal rules and communication but also on intergroup relationships and collaboration through informal exchanges and interactions. Jagtap and Kamble (2020) argue that relational contracting approach offers an excellent opportunity to balance the supply chain initiatives of client and contractor, and also offers the possibility for client and contractor to take a unified approach to controlling the project performance.

In the same vein, Khattak et al. (2021) found that project employees' perceptions of informational fairness positively predict project performance. However, Lu et al. (2015) asserted that contractual governance is more meaningful in directly improving project performance, while relational governance is effective in controlling opportunistic behaviour in project implementation. Mitigating opportunistic behaviour is important for reducing transaction costs and improving project performance (Ahimbisibwe & Nangoli, 2012; Liu et al., 2009; Watabaji, 2014). This leads to the hypothesis below:

H2: *Relational governance positively and significantly relates with project performance.*

2.2.3. Contractual governance and risk management practices

Risk management involves risk identification, analysis, response, monitoring and control (El Baz & Salomé, 2020; Junior & Carvalho, 2013; Pimchangthong & Boonjing, 2017). Guo et al. (2014) observed that there are limited studies that examine how different governance structures influence the risk management process to achieve differing outcomes. Project risk management is the systematic process of identifying, analyzing and responding to risks that are potentially detrimental to achieving project objectives (PMI, 2004). Kutsch et al. (2013) consider information system project risk to be the product of uncertainty associated with risk factors and the potential loss or harm to the project. Haq et al. (2019) noted that the presence of requirements risk tends to negatively moderate the influence of contractual and relational governance on project performance. Similarly, Tukamuhabwa et al. (2017) found that appropriate contracting is an important strategy for managing risk in Ugandan manufacturing supply networks. Zwikael and Smyrk (2015) also argued that the selection of governance mechanisms depends upon the level of risks involved. This therefore suggests that:

H3: *Contractual governance positively and significantly relates with risk management practices.*

2.2.4. Relational governance and risk management practices

Jagtap and Kamble (2020) argued that the client–contractor dyad involved in construction projects often experiences relational hazards due to the uncertainties and risks in project execution. It is also observed that research that examines how different governance structures influence the risk management process is limited (Guo et al., 2014). De Man and Roijakkers (2009) examined the influence of relational governance structure of alliances in the construction projects on mitigating risks. Furthermore, Atkin and Skimore (2008) argued that by incorporating relational risks into a project governance structure, risks of conflict and interactions of human factors, such as bounded rationality and other moral hazards can be better understood, predicted and planned for. This therefore leads to the hypothesis below:

H4: *Relational governance positively and significantly relates with risk management practices.*

2.2.5. Risk management practices and project performance

Bakker et al. (2010) argued that the contribution of risk management to a particular project's success is indirect, if the risk-related information collected is to be used in future projects. Haq et al. (2019) noted that the presence of requirements risk tends to negatively moderate the influence of contractual and relational governances on project performance. However, Carvalho and Junior (2015) observed that some survey-based studies have found that risk management has a low impact on project performance. Bakker et al. (2010) suggested that even moderate levels of risk management planning can suffice to reduce the negative effects of risk on project success. Odimabo and Oduoza (2018) added that an effective project risk management guards against projects finishing late, exceeding budget or not meeting customer expectations. Similarly, Pimchangthong and Boonjing (2017) found that risk identification and risk response planning influence process performance and the success of IT projects.

Furthermore, Fernando et al. (2018) stated that the implementation of risk management in the development of new car models can contribute to the improvement of the project management performance and project success. In the same vein, Carbone and Tippett (2004) observed that failing to perform adequate risk management increases the possibility of project failure because having an effective method to plan for and manage project risks improves the management of project risks and project success. Junior and Carvalho (2013) also indicated that paying attention

to uncertainties during the project and making use of the risk management techniques are critical success factors that project managers should pay attention to. Liu (2016) also found that both user-related and project management risks negatively influence the performance of IT projects. Guo et al. (2014) observed that project risk management is treated as a central approach to increasing the chance of project success. In the same line, Zhang et al. (2018) found evidence revealing that social system risk, technical system risk, and project management risks negatively affect business process outsourcing project satisfaction. Lastly, Crispim et al. (2018) found that organisational project risk management maturity influences project performance. Hence the following hypothesis is stated:

H5: *Risk management practices positively and significantly relate with project performance.*

2.2.6. Contractual governance, relational governance, risk management practices and project performance

Lu et al. (2015) argue that relational governance enhances project performance indirectly through effectively controlling the risk of opportunistic behaviour in the implementation of projects. According to Guo et al. (2014), different governance structures influence the risk management process, which helps in achieving different project outcomes. Furthermore, Brahm and Tarziján (2015) argued that contractual governance boosts project performance by effectively allocating the project risks and aligning the enforceable standards with those of project goals. Haq et al. (2019) noted that requirements risk moderates in the influence of contractual and relational governance on project performance. Finally, Lu et al. (2015) argued that contractual governance directly improves project performance, while relational governance improves project performance through controlling the risk of opportunistic behaviour in project implementation. This underlines the importance of risk management in the governance mechanisms-project performance relationship. Hence, the two related hypotheses are stated as follows:

H6a: *Risk management practices mediate in the relationship between contractual governance and project performance.*

H6b: *Risk management practices mediate in the relationship between relational governance and project performance.*

The proposed model demonstrated in Figure 1 suggests that governance mechanisms represented by both contractual governance and relational governance influence both risk management practices and project performance. Further, it is proposed that risk management practices mediate in the governance mechanisms–project performance relationship.

3. Methodology

3.1. Design, population and sample

This study follows an objectivism ontology, positivist epistemology and reductionist positioning of testing pre-stated hypothesis derived from the previous literature. A cross-sectional survey design using a self-administered structured questionnaire was used. The cross-section design allowed collection of data at a point in time (i.e. within a period of three consecutive months). The data were analyzed by using Partial Least Square Structural Equation Modeling. The population of the study comprised 85 Water and Sanitation projects under the Ministry of Water and Environment in South-Western Uganda. The unit of analysis was a project, while the unit of inquiry was a project manager or any other officer dealing with project management and possessing the relevant knowledge. A simple random sample size of 70 projects was chosen and 66 useable questionnaires were collected and analyzed.

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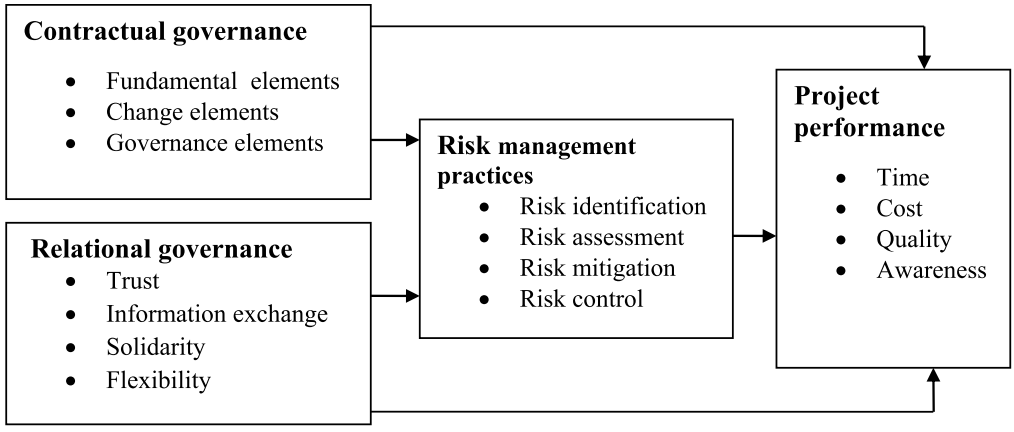
Figure 1. Conceptual framework.



3.2. Measurement of variables

The measurement scales for the study variables were adapted from the previous research. The responses were based on a 5-point Likert scale ranging from "5 = strongly agree, 4 = agree, 3 = undecided, 2 = disagree and 1 = strongly disagree". Contractual governance was measured using dimensions of fundamental characteristics, change management characteristics and governance characteristics adapted from Haq et al. (2019). The measures for relational governance were trust, information exchange, solidarity and flexibility as adapted from Haq et al. (2019). Risk management practices were measured basing on dimensions of risk identification, risk assessment, risk mitigation and risk control which were adapted from the works of Junior and Carvalho (2013) and El Baz and Salomé (2020). Finally, project performance was measured using dimensions of time, cost, quality and awareness as adapted from Ahimbisibwe and Nangoli (2012).

3.3. Measurement validation

To validate the measurement scales, the adequacy and suitability of the sample was firstly assessed by using Kaiser–Meyer–Olkin (KMO) and Bartlett's tests. All KMO values were above the required threshold of 0.7 and Bartlett's test reached significance ($p < .05$). As observed in Table 1, convergent validity of the items was examined based on standardized item loadings and average variance extracted (AVE), which were both generally above the acceptable thresholds of 0.708 and 0.5, respectively (Hair et al., 2020). Internal consistency was tested using Cronbach's alpha and composite reliability. Table 1 demonstrates that both Cronbach's alpha and composite reliability indices exceeded the acceptable threshold of 0.7 as recommended by Hair et al. (2020).

Discriminant validity was measured by the heterotrait–monotrait (HTMT) ratio, which assessed the degree to which the observed factors truly differed from others (Henseler et al., 2015). From Table 2, it can be seen that the HTMT ratios for the study constructs are below the 0.85 threshold, suggesting that the constructs discriminate well.

4. Analysis and results

4.1. Descriptive results

In terms of age group of individual respondents, they were dominantly in the range of 26–35 age categories (63.6%) followed by those in the category of 36–45 years (27.3%). The results are an indication that the majority of the respondent employees working in the studied water and sanitation projects are relatively middle-aged persons. Regarding the level of education, the majority of the respondents (66.7%) were educated to the Bachelor's degree level while up to 22.7% had master's degree qualifications. For the position held in the organization, the majority of the respondents were at officer level (89.4%), followed by senior officers (7.6%). In the case of

Table 1. Construct reliability and convergent validity

Variables	Item codes	Loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Contractual Governance	CGCHA1	0.788	0.747	0.782	0.852	0.657
	CGCHA2	0.794				
	CGCHA3	0.849				
Project Performance	PAWAR1	0.757	0.869	0.882	0.897	0.555
	PAWAR2	0.708				
	PAWAR3	0.705				
	PAWAR4	0.716				
	PQUAL2	0.767				
	PQUAL4	0.761				
	PQUAL6	0.798				
Relational Governance	RLGTR1	0.758	0.799	0.801	0.869	0.625
	RLGTR2	0.843				
	RLGTR3	0.763				
	RLGTR4	0.794				
Risk Management Practices	RMPAS1	0.778	0.807	0.822	0.863	0.560
	RMPAS4	0.815				
	RMPAS5	0.712				
	RMPRC1	0.746				
	RMPRC2	0.781				

gender of respondents, the majority were males at 60.6% and female respondents constituted 39.4%. For the project characteristics, most of the projects were between 5 and 10 years and a few had over 10 years. For the workforce size, most of the projects had over 100 employees (53%), followed by those between 6 and 50 employees (28.8%). This implies that most water and sanitation projects in Uganda qualify to be large enterprises.

4.2. Correlation analysis

The Pearson (*r*) correlations coefficient was used to examine the existence of relationships between the study variables. From Table 3, it can be observed that all study variables have positive and significant linear relationships. This is important to enable us to proceed with running a variance-based PLS-SEM.

Table 2. Discriminant validity: heterotrait–monotrait ratio (HTMT) – matrix

	1	2	3	4
Contractual Governance (1)				
Project Performance (2)	0.504			
Relational Governance (3)	0.576	0.652		
Risk Management Practices (4)	0.366	0.636	0.705	

4.3. Hypotheses tests results

The study hypotheses were tested using SmartPls 4.0.9.0, by bootstrapping to estimate standard errors and levels of significance. To arrive at significance, 10000 subsamples were used with a no sign significant option at a 95% bias corrected confidence interval. The path weights were examined based on the path coefficients and their significance levels. From Table 4 and Figure 2, it is revealed that there is a positive and significant relationship between contractual governance and project performance (β = 0.234, p = 0.035), thereby supporting H1. The study also found that there is a positive but non-significant relationship between relational governance and project performance (β = 0.247, p = 0.088). This implies that H2, which suggests that there is a positive and significant relationship between relational governance and project performance, is not supported.

Furthermore, the results revealed a positive but non-significant relationship between contractual governance and risk management practices (β = 0.047, p = 0.713). This implies that H3 is rejected. The study results also found a positive and significant relationship between relational governance and risk management practices (β = 0.576, p = 0.000) in support of H4. Finally, in support of H5, the study revealed a positive and significant relationship between risk management practices and project performance (β = 0.354, p = 0.006).

With regards to mediation testing, the study results in Table 4 demonstrate that risk management practices significantly mediate in the relationship between relational governance and project performance (β = 0.204, p = 0.016). Hence, H6a is supported. According to Baron and Kenny (1986), in case of a non-significant direct relationship between an independent variable and a dependent variable, and a significant indirect relationship between them, we infer that the meditator plays a full mediating role. Lastly, the results indicated a non-significant mediating role of risk management strategies between contract governance and project performance (β = 0.017, p = 0.717). Hence, H6b is not supported.

5. Discussion

From the data analysis, it was revealed that there is a positive and significant relationship between contractual governance and project performance. This implies that water and sanitation project contracts that embrace change elements such as specifying the major principles or guidelines for handling unanticipated contingencies as they arise, providing alternative solutions for responding to various contingencies that are likely to arise and allowing quick response to match changing client requirements can enhance the performance of water and sanitation projects. In addition, incorporating fundamental elements in contracts such as specifying detailed obligations and rights of contracting parties, providing a clear statement of the time, place, and the way of project fulfillment can lead to improved water and sanitation project performance. Furthermore,

Table 3. Correlation analysis

	Mean	SD	1	2	3	4
Contractual Governance (1)	1.515	.434	1.000			
Relational Governance (2)	1.869	.624	.569**	1.000		
Risk Management Practices (3)	2.076	.730	.563**	.619**	1.000	
Project Performance (4)	1.551	.494	.649**	.598**	.600**	1.000

**Correlation is significant at the 0.01 level (two-tailed).

Table 4. Hypotheses tests results β T stat P values Bca β T stat P values Bca

	β	*t* Stat	*p* Value	BCA
ContractualGovernance -> ProjectPerformance	0.234	2.114	.035	0.009, 0.431
ContractualGovernance -> RiskManagementPractices	0.047	0.368	.713	0.222, 0.278
RelationalGovernance -> ProjectPerformance	0.247	1.708	.088	0.039, 0.529
RelationalGovernance -> RiskManagementPractices	0.576	7.123	.000	0.379, 0.707
RiskManagementPractices-> ProjectPerformance	0.354	2.741	.006	0.085, 0.597
RelationalGovernance -> RiskManagementPractices-> ProjectPerformance	0.204	2.404	.016	0.052, 0.389
ContractualGovernance -> RiskManagementPractices -> ProjectPerformance	0.017	0.362	.717	0.085, 0.106
ContractualGovernance -> ProjectPerformance	0.251	1.952	.050	0.023, 0.482
ContractualGovernance -> RiskManagementPractices	0.047	0.368	.713	0.222, 0.278
RelationalGovernance -> ProjectPerformance	0.451	4.023	.000	0.201, 0.646
RelationalGovernance -> RiskManagementPractices	0.576	7.123	.000	0.379,0.707
RiskManagementPractices-> ProjectPerformance	0.354	2.741	.006	0.085, 0.597

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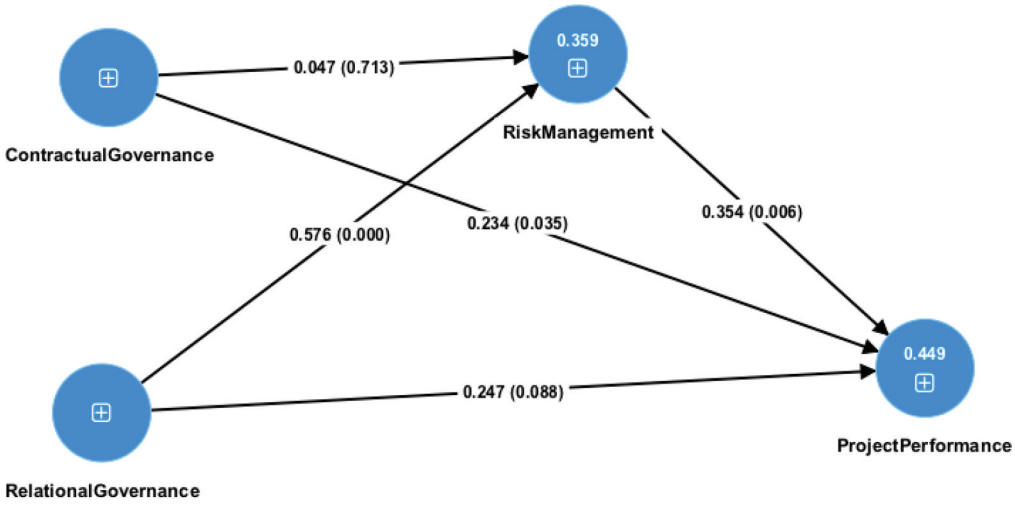
Figure 2. PLS-SEM for project performance.



emphasizing contractual governance elements such as clear expression of the default definitions and formula in contracts and giving detailed description of conditions under which contract termination occurs results in improved water and sanitation project performance.

This finding agrees with Brahm and Tarziján (2015), who argued that contractual governance enhances project performance by effectively allocating the project risks and aligning the enforceable standards with those of project goals. Similarly, Wang et al. (2019) stressed that contractual governance has a stronger positive impact on project performance than relational governance in the early stage of the project. This also concurs with Solís-Molina et al. (2020) who affirmed that contractual governance is a more fundamental governance mechanism for co-exploitation projects compared to informal governance. However, the finding seems to contradict that of Kadefors (2004), which concluded that contractual incentives and close monitoring of contractor performance may induce opportunism in construction projects. The Ugandan water and sanitation projects are public and funded by the government whereby employees in charge of implementation are fond of unethical behaviour by conniving with contractors (Tukamuhabwa et al., 2023). Hence, emphasizing contract governance is important to specify the terms and obligations in specific projects to guard against such unethical behaviour that would affect performance during project implementation.

Furthermore, the study did not find a significant direct relationship between relational governance and project performance. This particular finding suggests that in Ugandan water and sanitation projects, relational facets such as trust, integrity, honesty, sharing of project plans and implementation schemes, cooperation and information exchange may not directly improve project performance. This finding concurs with scholars who argued that information asymmetries that are common in collaborative relationships can increase the transaction costs in inter-organizational projects (Wu et al., 2016). However, the findings contradict Wang et al. (2019)'s observation that relational governance is more effective than contractual governance in restricting opportunism for improved project performance.

The findings further revealed that risk management practices fully mediate between relational governance and project performance. This implies that relational governance can influence water and sanitation project performance in Uganda only through risk management practices. This again re-echoes the problem of unethicality in Ugandan public sector whereby relational governance can only improve project performance if the project risks emanating from relationship-related unethical practices such as opportunism, bid rigging, collusion and deliberate non-compliance are well managed (Tukamuhabwa et al., 2023).

Furthermore, the study revealed that there is no significant relationship between contractual governance and risk management practices. This finding suggests that even if project contracts embrace contractual elements such as specifying the major principles or guidelines for handling unanticipated contingencies as they arise, providing alternative solutions for responding to various contingencies, providing detailed obligations and rights of every party and detailing the circumstances for contract termination, risk management practices may not be improved. This contradicts Guo et al. (2014) who underlined the influence of governance structures on the risk management process and outcomes.

Similarly, Haq et al. (2019) remarked that the presence of requirements risk tends to negatively moderate the influence of contractual and relational governance on project performance. In addition, Tukamuhabwa et al. (2017) found that appropriate contracting is an important strategy for managing risk in Ugandan manufacturing supply networks. However, this finding reflects Ugandan unethical public projects environment, where project implementers deliberately ignore the risks involved in particular projects in order to achieve their own individual benefits. Consequently, besides the existence of formal contracts, many of the water and sanitation projects in Uganda encounter risks related to delays and cost overruns (Water and environment sector performance report, 2020). Other scholars have similarly argued that detailed contracts, contractual incentives and close monitoring reduce trust, aggravate cheating and encourage opportunism during project implementation (Kadefors, 2004; Watabaji, 2014).

The finding of a positive and significant relationship between relational governance and risk management practices in this study implies that water and sanitation projects in which parties embrace relational governance facets such as trust, solidarity, flexibility and information exchange can improve on the risk management practices. This concurs with De Man and Roijakkers (2009) who underlined the influence of relational governance structure of alliances in the construction projects on mitigating risks. Atkin and Skimore (2008) also argued that by incorporating relational risks into a project governance structure, risks of conflict and interactions of human factors, such as bounded rationality and other moral hazards can be better understood, predicted and planned for. It has already been noted that in the Ugandan water and sanitation projects, the management of risks related to cost overruns and delays can be influenced by the actions accruing from the personal relationships between implementers such as collusion (Tukamuhabwa et al., 2023; Water and environment sector performance report, 2020).

Finally, it was also established that there is a positive and significant relationship between risk management practices and project performance. This suggests that water and sanitation projects in which risk identification, risk assessment, risk mitigation and risk control are emphasized can achieve improved performance. For example, projects where employees are highly sensitized about project risk sources, occurrence, impact, early warning signs and risk management can improve project performance for example by minimizing project delays and other deficiencies.

This concurs with scholars such as Bakker et al. (2010) who supported the contribution of risk management to a particular project's success. Similarly, Odimabo and Oduoza (2018) added that an effective project risk management guards against projects finishing late, exceeding budget or not meeting customer expectations. In the same line, Pimchangthong and Boonjing (2017) found that risk identification and risk response planning influence the process performance and the success of IT projects. Generally, several other scholars support the positive influence of risk management practices on project performance (Crispim et al., 2018; Fernando et al., 2018; Guo et al., 2014; Junior & Carvalho, 2013; Liu, 2016; Zhang et al., 2018).

6. Conclusion

This study examined the relationship between governance mechanisms, risk management practices and performance of water and sanitation projects in Uganda. Through a cross-sectional survey design, data were collected from a sample of 66 water and sanitation projects

in South-western Uganda and analyzed by using SmartPls Structural Equation modeling. The results revealed positive and significant relationships between contractual governance and project performance; relational governance and risk management practices, and risk management practices and project performance. However, the relationships between relational governance and project performance, and contractual governance and risk management practices were not significant. Further, it was revealed that risk management practices fully mediate in the relationship between relational governance and performance of water and sanitation projects in Uganda.

6.1. Theoretical implications

This study contributes to the debate on transaction cost economics theoretical explanation of water and sanitation project performance, which has been limited. Hence, it contributes to the literature on the antecedents of water and sanitation project performance in a developing country context and confirms the importance of both relational and contractual governance mechanisms. Furthermore, by establishing that risk management practices fully mediate in the relational governance-project performance relationship, this study contributes by addressing the gap of limited understanding of the mechanism through which governance mechanisms influence project performance (Haq et al., 2019) as well as the controversial debate on the contribution of risk management on project performance (Carson et al., 2006; Bakker et al., 2010; Jun et al., 2011, Kutsch et al., 2012; Guo et al., 2014).

6.2. Practical implications

In practice, water and sanitation project managers should enhance contractual governance. For example, they should ensure that the contracts they make with their project contractors contain well-drafted change elements that clearly specify the major principles or guidelines for handling unanticipated contingencies as they arise, provide alternative solutions for responding to various contingencies that are likely to arise and allow quick response to match changing client requirements. In addition, managers should ensure that the contracts contain fundamental elements such as specifying detailed obligations and rights of contracting parties and providing a clear statement of the time, place, and the way of project fulfillment. Furthermore, managers should ensure that the contracts they make with project contractors contain well-drafted contractual governance elements such as clear expression of the default definitions and formula and giving detailed description of conditions under which contract termination should take place.

Second, managers of water and sanitation projects should embrace relational governance. They should develop trust with their project implementation partners by promoting high levels of integrity and honesty, sharing of project plans and implementation schemes. They should also regard each other as major partners. Also, flexible working relationships should be emphasized by encouraging cooperation to work out solutions if some unexpected situations arise and making adjustments to cope with changing circumstances. In addition, managers should ensure that parties in the water and sanitation projects effectively exchange information that can help in risk identification and management in order to avoid obstacles to project performance. Such relational governance is expected to enhance risk management practices, which will then lead to improved project performance.

Third, since risk management practices fully mediated in the relationship between relational governance and project performance, managers of water and sanitation projects should develop and strengthen their risk management practices. They should develop a risk management culture, establish and strengthen risk management sections purposely for risk identification, risk assessment, risk mitigation and risk control. Water and sanitation project employees should be highly sensitized about project risk sources, occurrence, impact, early warning signs and risk management in order to minimize or avoid the potential risks to project success.

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7. Limitations and future research directions

Finally, this study has some limitations, which may limit the applicability of findings. For example, the cross-sectional design used precludes our understanding of variables such as relational governance and its behavioral elements like trust which develops over time. Further research with a longitudinal focus could shed more light on the interplay of different governance mechanisms during the life of a project. Second, the quantitative design with close-ended questionnaires used in this study could not help to provide in-depth information and explanations. Further research using interviews and case-studies can provide more in-depth information. This study was also only limited to water and sanitation projects in western Uganda, which limits general application to all projects in Uganda and other developing economies. Future similar research could be conducted in other contexts to improve on the generalizability of findings. Lastly, the sample used was relatively small, future research could also use a much larger sample size to further improve on the validity and generalizability of findings.

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