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Strategic Risk Management as a Driver of Service Delivery in Public Water Utilities: Empirical Evidence From Uganda

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Abstract: This study examined the effect of strategic risk management on service delivery in public water utilities, using the National Water and Sewerage Corporation (NWSC) in the Kampala Metropolitan Region as a case study. Grounded in Agency Theory, the Resource-Based View, and the Balanced Scorecard Theory, the research employed a descriptive cross-sectional design with a mixed-methods approach. Data were collected from 481 respondents comprising NWSC managers and customers through structured questionnaires and semi-structured interviews. The findings revealed that strategic risk management is the strongest predictor of service delivery ($\beta = 0.425$, $p < 0.001$), explaining a substantial proportion of the variance in service delivery. The descriptive statistics demonstrated strong agreement among respondents, with an overall mean of 3.94 (SD = 0.88). The highest-rated item was "NWSC maintains reliable service delivery even amidst unexpected operational or external challenges" (M = 4.06, SD = 0.88), followed by "NWSC proactively identifies and communicates potential service risks before they cause major disruptions" (M = 3.99, SD = 0.86). However, the item "NWSC's operational policies and procedures result in consistent and professional service delivery to the public" (M = 3.81, SD = 0.87) received the lowest mean score, indicating a gap between macro-level risk management and consistent frontline service quality. The study concludes that strategic risk management constitutes a critical organizational capability through which public water utilities enhance resilience, protect strategic resources, and consistently deliver high-quality services. The findings provide empirical support for the integration of enterprise risk management into strategic planning and operational decision-making in public utilities.

Keywords: *Strategic Risk Management, Enterprise Risk Management, Service Delivery, Public Water Utilities, Uganda, Agency Theory, Resource-Based View, Balanced Scorecard.*

1. Introduction

The condition of public water supply in developing nations is understaken with great uncertainties, as they face financial constraints, infrastructure failure, climate variability, regulatory changes, and operational disturbances (World Bank, 2025; Andersen & Young, 2023). Uncertainties will create significant challenges for service provision, and may potentially impact public health, economic and social gains (Sinha, 2024; Kedarya et al., 2023). The strategic risk management capability has become a determining factor for utilities to assess, monitor, mitigate, and manage risks that could hinder the delivery of service, with an impact that is increasingly evident in the efficient management of assets and energy resources (Jiménez et al., 2024; Eduard & Ni, 2023).

Although risk management is well known as a crucial component in service delivery, there is lack of systematic empirical research into how risk management affects service delivery in public water utilities, especially in developing

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country settings. Most of the previous research have been about financing activities or the financial risk management without considering other strategic practices in risk management (Owomugisha, 2022; Kazaara & Audrey, 2024). This study fills this gap considering the intervener (NWSC) in Uganda as a case study, to look at the effects of strategic risk management on the service delivery in the studied Public Water Utility.

National Water and Sewerage Corporation (NWSC) is liable to various dangers which can bring engineering service interruption, such as the ageing infrastructure, inclement climate, economic constraints and operations challenges (NWSC, 2023). About 40% of the urban population in Kampala Metropolitan area has poor access to safe water and nearly 60% of the households have inadequate sanitation facilities (NWSC, 2023). If slow response times to leakages — averaging 72 hours — and poor optimisation of water treatment chemicals are not enough to convey the message, it is hard to imagine that NWSC's struggles in the field have come to an end yet, as clearly shown by its performance indicators (Mogues et al., 2023).

The theoretical framework of this study is based on three theories: Agency Theory (Jensen & Meckling, 1976), which discusses how risk management helps enhance managerial accountability and reduce agency cost; Resource Based View (RBV) theory (Barney, 1991) that recognizes risk management capabilities as valuable organizational resource and; Balanced Scorecard Theory (BSC) (Kaplan & Norton, 1992) that argues internal processes and organizational resilience as the most important competency for sustainable performance.

The study aimed to explore the effect of strategic risk management practices on service delivery in the National Water and Sewerage Corporation, Kampala Metropolitan Region.

2. Literature Review

2.1 Theoretical Framework

The theories that underpin this study are agency theory, resource-based view, and balanced scorecard.

Jensen and Meckling (1976) founded and popularised agency theory which suggested that may managers and business organizations (the agents) have different interests to the business owners or shareholders (the principals). Good management control provides strong internal control mechanisms, facilitates financial transparency in product decision-making and helps to minimize managerial opportunism behavior of managers (Zogning, 2017; Huu Nguyen et al., 2020). Risk management is a mechanism of governance that ensures that behaviors and actions of managers are in line with organizational goals and stakeholder expectations. Barney (1991) suggested that the success of an organization in terms of sustainable performance is contingent upon the safe-guarding and effective utilization of strategic resources of the organization. Risk management helps protect key aspects of an organization such as its finances, assets, infrastructure, technology, institutional reputation and human resources assets (Mailani et al., 2024; Sabourin, 2020). Integrated Risk Framework is a very special characteristic of the organisation, and it decreases the value of the firm and its ROE (return on equity) (Lunden & Sjöberg, 2023). The view point, on the other hand, was taken by Kaplan and Norton (1992) who had stated that balanced performance of an organization requires integrating financial metrics with satisfaction of customers, internal processes, innovation and organizational learning. Therefore, strategic risk management is able to strengthen all four Balanced Score Card perspectives, which is how it protects the financial resources, maintains stability in operational processes, keeps consumers' expectations met and continuously enhances institutional resilience (Amer et al., 2022; Kumar et al., 2024).

2.2 Strategic Risk Management

Strategic risk management involves the process of identification, assessment, mitigation and monitoring of risks that could affect the achievement of organizational goals. (Kedarya et al., 2023) The risks can be internal or external, ranging from market volatility, new technologies, regulatory requirements, to inefficient working processes (Andersen & Young, 2023). The strategic risk management is a complete and future-oriented concept (Jiménez et al., 2024) which includes the strategic interest of the organization in the implementation of a risk management process.

Over the past few decades, enterprise risk management (ERM) has become a new style of managing risk that integrates risk management into every branch of the business (Lunden & Sjöberg, 2023; Nocco & Stulz, 2006). Through a process of clustering, risk scenarios are identified and assessed using the ERM framework, allowing organisations to perform better, and to undertake a proactive risk management process (Clarke & Varma, 1999).

2.3 Risk Management and Service Delivery

By anticipating and managing potential roadblocks to service delivery, strategic risk management plays a crucial role in shaping the overall quality of its operations (Sinha, 2024). Prompt identification and mitigation of threats could ensure that they offer reliable services at all times, meeting client expectations (Noraznira et al., 2023). Good risk management outcomes, lead to less disruption for consumers, allows for continuity services, and increases the level of satisfaction and customer loyalty (Jiménez et al., 2024).

Business continuity planning is an integral part of risk management, which is at the core of business strategy, and ensures business services continue to be provided during emergencies (Gamze & Demirel, 2019). Business continuity plans involve identifying what services are critical to the operation of the business, and developing strategies to continue these services in the event of disruptive activities (Sinha, 2024). Strong risk management systems provide organisations with greater ability to maintain service delivery, particularly in challenging circumstances (Andersen & Young, 2023).

2.4 Empirical Evidence

Empirical studies that have been undertaken so far have found that risk management is significantly related to organizational

performance. The study by Alex and Devis (2023) found that strong risk management practices, such as the fact that risk policies are linked to strategic goals, was a key determinant of financial performance in the Ugandan commercial institutions. Fowet, Oviogbo, and Okibe (2011) discovered that those proactive systems of identification and evaluation of risk directly reduce financial damage and improve decision making in banking branches in Uganda.Owomugisha (2022) concluded that in Uganda the proactive practice of identifying and assessing risk directly reduced financial losses and optimised decision making in banking branches.

Kazaara and Audrey (2024) found that risk management takes up almost 39.3% of the overall variation in financial performance of public sector organizations in Uganda. Ntirandekura et al. (2022) described four structured steps for managing the risks that can help companies overcome crises and survive. In 2023, studies pointed out that in the public sector, managing risks is crucial for minimizing disruptions, minimizing financial turbulence and safeguarding the delivery of services.

In the water supply sector, Vinnari and Vinnari (2022) looked at ways how water supply service control in Finland could be combined with the integration of sustainability risk management to the long-term strategic long-term planning of water supply infrastructure, in order to maintain the resilience of the water supply infrastructure. Merton and Rossi (2024) discovered that proactive risk management is a ‘strategic buffer' that mitigates costs of financial distress and enhances net interest margins because it helps keep capital levels adequate even in the face of turbulence in the economy.

3. Methodology

3.1 Research Design

The study adopted a descriptive cross-sectional research design with a mixed-methods approach, combining quantitative surveys and qualitative interviews. The cross-sectional design enables the collection of data at a specific point in time, making it both cost-effective and time-efficient (Creswell & Creswell, 2018).

3.2 Study Population and Sample

The target population comprised top-level managers of NWSC in the Kampala Metropolitan area (23 managers) and active customers within the region (374,892). Using Krejcie and Morgan's (1970) sample size determination table, a sample of 544 respondents was selected. Stratified random sampling was used to select customers, while a census approach was adopted for top-level managers. The final sample comprised 481 respondents (345 customers and 136 managers), representing a response rate of 88.4%.

3.3 Data Collection Instruments

Data were collected using structured self-administered questionnaires and semi-structured interview guides. The questionnaire measured strategic risk management practices using items covering risk identification, assessment, mitigation, monitoring, and business continuity planning. Items were measured on a five-point Likert scale. The questionnaire was pretested with a sample of 30 respondents to ensure clarity and reliability.

3.4 Validity and Reliability

Content validity was assessed through expert review and computation of the Content Validity Index (CVI = 0.90). Reliability was assessed using Cronbach's Alpha ($\alpha = 0.765$ for Strategic Management of Risk), indicating acceptable internal consistency.

3.5 Data Analysis

Quantitative data were analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) were computed. Pearson correlation and multiple regression analysis were employed to examine relationships between variables and test hypotheses. The regression model was specified as:

$$SD = \beta_0 + \beta_1 SMR + \beta_2 SPP + \beta_3 SBP + \beta_4 SOP + \beta_5 SC + \varepsilon$$

Where SD = Service Delivery, SMR = Strategic Management of Risk, SPP = Strategic Planning Practices, SBP = Strategic Budgeting Practices, SOP = Strategic Ongoing Procedures, SC = Staff Commitment, β_0 = Constant, and ε = Error term.

Qualitative data from interviews were analyzed using thematic content analysis.

4. Results

4.1 Descriptive Statistics

The descriptive statistics for strategic risk management demonstrated strong agreement among respondents, with an overall mean of 3.94 (SD = 0.88). The highest-rated item was "NWSC maintains reliable service delivery even amidst unexpected operational or external challenges" (M = 4.06, SD = 0.88), reflecting strong confidence in organizational resilience. The substantial percentage of respondents who "Strongly Agree" (33.1%) further emphasizes this assertion.

Table 1: Descriptive Statistics for Strategic Risk Management

Item	Mean	SD	% Agree
NWSC maintains reliable service delivery even amidst unexpected operational or external challenges	4.06	0.88	81.1%

Item	Mean	SD	% Agree
NWSC proactively identifies and communicates potential service risks before they cause major disruptions	3.99	0.86	80.2%
NWSC uses data and performance metrics systematically to manage service delivery and solve problems	3.96	0.88	78.8%
NWSC's investment decisions in infrastructure visibly lead to improved water or sewerage service reliability	3.93	0.89	76.1%
NWSC manages its financial and operational resources to ensure long-term service sustainability	3.91	0.90	76.7%
NWSC adapts its plans and processes based on lessons learned from past service failures or challenges	3.90	0.88	75.7%
NWSC's operational policies and procedures result in consistent and professional service delivery to the public	3.81	0.87	71.7%

The item "NWSC's operational policies and procedures result in consistent and professional service delivery to the public" (M = 3.81, SD = 0.87) received the lowest mean score, indicating a gap between macro-level risk management and consistent frontline service quality. The higher percentage of "Neutral" (20.4%) responses for this item further indicates uncertainty or variability in experience.

4.2 Correlation Analysis

Pearson correlation analysis revealed a moderate to strong positive correlation between strategic risk management and service delivery ($r = 0.567$, $p < 0.01$), indicating that effective risk identification, assessment, and mitigation practices are important in enhancing the reliability and consistency of service delivery.

4.3 Regression Analysis

Multiple regression analysis revealed that strategic risk management is the strongest predictor of service delivery ($\beta = 0.425$, $p < 0.001$). A one-unit increase in risk management practices leads to a substantial 0.252-unit increase in service delivery, holding other variables constant. The strong standardized beta coefficient confirms that SMR has the highest relative contribution to service delivery among all predictors.

Table 2: Regression Results for Strategic Risk Management

Variable	B	Std. Error	Beta	t	p-value
Constant	1.552	0.073		21.273	<0.001
Strategic Risk Management	0.252	0.049	0.425	5.187	<0.001

Note: Model includes SPP, SBP, SOP, and SC as covariates. N = 481.

4.4 Qualitative Findings

Thematic analysis of interview data revealed the critical role of risk management in ensuring service continuity. One manager stated: "Water supply can be disrupted by so many things—power outages, pipe bursts, drought, even political instability. The team that manages these risks is the reason we still have water flowing most of the time. They have contingency plans for almost everything."

Another respondent emphasized: "The proactive identification of risks is essential. We can't wait for problems to happen; we need to anticipate them and have plans in place. That's what keeps our service reliable."

5. Discussion

5.1 Strategic Risk Management as the Strongest Predictor

The finding that strategic risk management is the strongest predictor of service delivery ($\beta = 0.425$) underscores the critical importance of risk mitigation in ensuring service continuity in public water utilities. This can be attributed to the unique operational environment of NWSC, where service delivery is exposed to multiple risks including infrastructure failures,

financial uncertainties, and environmental challenges (Sinha, 2024; Andersen & Young, 2023).

The findings support Agency Theory, as effective risk management enhances managerial accountability by establishing robust internal control systems and promoting transparency in financial decision-making (Jensen & Meckling, 1976; Huu Nguyen et al., 2020). The results also reinforce the Resource-Based View, as an integrated risk framework serves as a rare organizational capability that protects the firm's market value and return on equity (Barney, 1991; Lunden & Sjöberg, 2023).

The findings align with the Balanced Scorecard's emphasis on internal processes and organizational resilience (Kaplan & Norton, 1992). The high score on maintaining reliable service delivery amidst challenges (M = 4.06) indicates that stakeholders perceive NWSC as possessing robust risk management capabilities that ensure service continuity (Amer et al., 2022; Kumar et al., 2024).

5.2 Proactive Risk Identification and Communication

The finding that "NWSC proactively identifies and communicates potential service risks before they cause major disruptions" (M = 3.99) received high agreement indicates that stakeholders perceive the organization as effective in anticipating and communicating risks. This aligns with the observations of Merton and Rossi (2024), who found that proactive risk management acts as a "strategic buffer" that improves organizational resilience.

The low standard deviation (SD = 0.86) associated with proactive communication indicates a strong consensus regarding this visible aspect of risk governance. This suggests that NWSC has successfully institutionalized risk communication mechanisms that keep stakeholders informed about potential service disruptions.

5.3 Gap Between Macro-Level and Micro-Level Risk Management

The finding that "NWSC's operational policies and procedures result in consistent and professional service delivery to the public" (M = 3.81) received the lowest mean score indicates a gap between macro-level risk management and consistent frontline service quality. This suggests that while the organization excels at managing large-scale operational disruptions, there are challenges in standardizing the quality of direct customer interactions.

This aligns with the observations of Harrison and Smith (2022), who found that in highly proceduralized public utilities, risk-averse cultures can sometimes lead to "systemic friction" if risk management protocols are not aligned with frontline staff agency. The higher percentage of "Neutral" (20.4%) responses for this item further indicates uncertainty or variability in experience.

5.4 Data-Driven Risk Management

The finding that "NWSC uses data and performance metrics systematically to manage service delivery and solve problems" (M = 3.96) received high agreement indicates that stakeholders perceive the organization as data-driven in its risk management approach. This aligns with the observations of Van Dijk and Meijer (2023), who found that the adoption of automated risk monitoring systems leads to improvements in asset quality and operational performance.

5.5 Long-Term Sustainability Focus

The finding that "NWSC manages its financial and operational resources to ensure long-term service sustainability, not just short-term fixes" (M = 3.91) received high agreement indicates that stakeholders perceive the organization as committed to long-term sustainability. This aligns with the observations of Vinnari and Vinnari (2022), who found that the integration of sustainability risk management into long-term strategic planning is essential for maintaining infrastructure resilience.

6. Conclusion

This study has demonstrated that strategic risk management is the strongest predictor of service delivery in public water utilities. Effective risk identification, assessment, mitigation, and monitoring enable organizations to maintain service continuity amidst operational and external challenges. The unique operational environment of NWSC—characterized by aging infrastructure, climate variability, and security challenges—necessitates robust risk management capabilities.

The finding that risk management remains significant even at low levels of staff commitment underscores its foundational importance in ensuring service reliability. However, the gap between macro-level risk management and consistent frontline service quality highlights an area for improvement. The study concludes that strategic risk management constitutes a critical organizational capability through which public water utilities enhance resilience, protect strategic resources, and consistently deliver high-quality services.

Recommendations

NWSC should strengthen enterprise risk management by establishing integrated risk management frameworks capable of identifying, assessing, monitoring, and mitigating strategic, operational, financial, environmental, and reputational risks. The corporation should invest in data analytics capabilities to enhance risk identification and monitoring. Management should ensure that risk management policies are effectively translated into consistent frontline service delivery through training, performance monitoring, and accountability mechanisms.

The corporation should develop comprehensive business continuity plans that address a wide range of potential disruptions. Regular risk assessments should be conducted, and risk mitigation strategies should be continuously updated based on lessons learned from past incidents. Management should foster a risk-aware culture that encourages employees at all levels to identify and report potential risks.

Limitations and Future Research

This study was subject to several limitations. First, the cross-sectional design limits causal inference. Second, the study relied on self-reported data. Third, the study focused

exclusively on the Kampala Metropolitan Region. Future research should adopt longitudinal designs to examine how risk management practices evolve over time. Comparative studies across different water utilities would determine whether the relationships established remain consistent under different institutional contexts.

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