PROCUREMENT RISK MANAGEMENT AND SUPPLY CHAIN PERFORMANCE OF TABLE WATER PRODUCERS IN MAKURDI, BENUE STATE, NIGERIA

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ABSTRACT

This study examined the effect of procurement risk management on the supply chain performance of table water producers in Makurdi, Benue State, Nigeria. Utilizing a census approach, data were collected from the entire population of 169 staff through a validated questionnaire, with a reliability coefficient of 0.854. Logit regression analysis, performed using SPSS Version 26, provided insights into the effects of various risk management practices on supply chain outcomes. The analysis reveals that contractual risk analysis (CRA) significantly enhances supply chain performance, with an estimate (B) of 0.498, a Wald statistic of 4.567, and a significance level of 0.002, indicating that each unit increase in CRA improves performance odds by approximately 3.645 times. This means that for each unit increase in contractual risk analysis, the likelihood of improved supply chain performance multiplies by 3.645. In contrast, supplier reliability assessment (SRA) shows no significant impact, with an estimated coefficient (B) of -0.065, a Wald statistic of 0.021, and a significance level of 0.885, suggesting limited effect on performance. Supplier risk assessment (SUA) is found to be statistically significant with an estimated coefficient (B) of 0.553, a Wald statistic of 2.608, and a significance level of 0.018, which implies that each unit increase in SUA boosts performance odds by about 2.738 times. Supply chain visibility (SCV) and sourcing and category management practice (SCM) show minimal impact, with estimates of 0.055 and -0.303 respectively, both statistically insignificant. The study conclude that not all procurement risk management practices contribute equally to supply chain performance as shown in the result, hence it is recommended among others that focusing on robust contractual risk management and comprehensive supplier risk assessments while considering resource reallocation from less impactful practices will be helpful for the studied firms.

Keywords: *Procurement Risk Management, Supply Chain Performance, Contractual Risk Analysis, Supplier Risk Assessment, Supply Chain Visibility.*

INTRODUCTION
BACKGROUND OF THE STUDY

Procurement risk management (PRM) is a strategic approach that organizations use to identify, assess, and mitigate risks associated with procurement processes, ensuring operational resilience and performance (Wreh & Kamara, 2023). PRM is vital in supply chain operations due to uncertainties related to product demand, cost fluctuations, and supply availability, which can significantly impact profitability (Sorunke, 2016). Various models and frameworks, such as procurement fraud risk management (Bukar, 2021) and capacitated option contracts (Lee & Richey, 2021), have been proposed to minimize procurement risks. In public procurement, risk management tools help assess and monitor procurement risks, particularly in humanitarian contexts (Hong, 2018). Additionally, procurement strategies in construction projects emphasize early involvement of project actors and collaboration to enhance risk management (Osipova, 2011). In the table water industry, procurement risks are assessed using five dimensions: contractual risk analysis, supplier reliability assessment, supplier risk assessment, supply chain visibility, and sourcing and category management practices. These dimensions provide a structured framework for evaluating procurement risks in the industry.

The global table water industry faces significant challenges, including environmental concerns, governance issues, and health risks due to contamination (Stoler, 2017). Studies have revealed the presence of heavy metals and pathogenic bacteria in table water, highlighting the need for stringent quality control measures (Emenike, 2017). In Nigeria, inadequate regulatory oversight has exacerbated these risks, underscoring the importance of implementing risk management tools like hazard analysis and critical control points (HACCP). Effective procurement risk management and supply chain integration are critical for improving product quality, ensuring compliance with health and safety standards, and enhancing competitiveness in the table water industry (Handayani, 2018). PRM and SCM are interconnected, with global supply chain risks necessitating coordinated efforts to mitigate disruptions (Gurtu, 2021). This study contributes to understanding the impact of procurement risk management on supply chain performance in table water production in Makurdi, Benue State, Nigeria, by examining the role of key risk management dimensions in mitigating procurement uncertainties.

STATEMENT OF THE PROBLEM

The table water production sector in Makurdi, Benue State, Nigeria, faces significant challenges that hinder supply chain efficiency. Ideally, a well-functioning supply chain would ensure timely delivery, cost control, and consumer satisfaction through effective procurement strategies and risk management. However, the reality is far from this ideal, as issues such as poor inventory management, unreliable transportation, and weak stakeholder coordination disrupt operations. External factors like economic instability and climate change further exacerbate these difficulties, while the lack of targeted research on procurement risk management leaves manufacturers ill-equipped to address these challenges (Wreh & Kamara, 2023). These inefficiencies have far-reaching consequences, including delays in production and distribution, higher operational costs, and concerns over product quality and safety. Without focused research and strategic interventions, the sector risks continued operational setbacks and declining consumer trust. To bridge this gap, it is essential to explore procurement risk management strategies such as contractual risk analysis, supplier reliability assessment, and supply chain visibility. This study seeks to analyze how these factors influence supply chain performance in the table water industry in Makurdi, providing actionable solutions for improving efficiency and sustainability.

OBJECTIVES OF THE STUDY

The main objective of this study is to examine the effect of procurement risk management on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria. The specific objectives of the study were to:

i. examine the effect of contractual risk analysis on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

ii. assess the effect of supplier reliability assessment on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

iii. determine the effect of supplier risk assessment on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

iv. assess the effect of supply chain visibility on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

v. assess the effect of sourcing and category management practice on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

The hypotheses were formulated in line with the specific objectives of the study

LITERATURE REVIEW
THEORETICAL FRAMEWORK

Two theories of procurement risk management discussed in this section are agency theory and transaction cost economics (TCE) theory.

AGENCY THEORY

Agency Theory, introduced by Ross and Mitnick in 1973, examines the relationship between principals and agents, particularly the conflicts that arise when agents prioritize their self-interest over the principal's objectives (Flynn & Davis, 2014). In procurement and supply chain management, these conflicts can lead to risks such as moral hazard and adverse selection. For example, in a table water company, suppliers may compromise quality to cut costs, potentially disrupting production and distribution (Wreh & Kamara, 2023). To mitigate these risks, the theory suggests mechanisms like performance evaluation systems, transparent contracts, and monitoring (Higgs, 2018). These strategies help ensure that agents act in the principal's best interest, improving supply chain efficiency (Wreh & Kamara, 2023). However, critics argue that agency theory overemphasizes self-interest and neglects trust and collaboration in business relationships (Eisenhardt, 1989). Monitoring can also be costly and may not fully resolve conflicts (Perrow, 1986). Despite these limitations, the theory remains relevant for analyzing procurement risks and improving supply chain management in the table water industry (Flynn & Davis, 2014).

TRANSACTION COST ECONOMICS (TCE) THEORY

Developed by Williamson (1975), TCE theory explains how firms minimize transaction costs in economic exchanges, particularly in procurement management (Mastenbroek & Wijn, 2016). For table water producers, procurement involves interactions with multiple suppliers and distributors, where uncertainties, information asymmetry, and opportunistic behaviors can increase costs. TCE suggests that companies should choose governance structures such as in-house production or outsourcing based on transaction cost minimization (Handley & Benton, 2000). The theory also highlights the role of contracts in procurement, as long-term agreements can help secure raw material supply and reduce disruptions (Mastenbroek & Wijn, 2016). However, critics argue that TCE focuses too much on cost efficiency while neglecting collaboration and flexibility, which are vital in modern supply chains. Despite its limitations, TCE provides valuable insights for table water producers by guiding procurement strategies that optimize supply chain performance and reduce risks (Spekman & Myrick, 1997).

CONCEPTUAL FRAMEWORK

Concept of procurement risk management and supply chain performance are discussed alongside its proxies. Figure 1 below shows the schematic diagram that describes the relationship between the various proxies of procurement risk management and supply chain performance. There is a direct relationship between contractual risk analysis, supplier reliability assessment, supplier reliability assessment, supply chain visibility, sourcing and category management practice and e-procurement and supply chain performance.
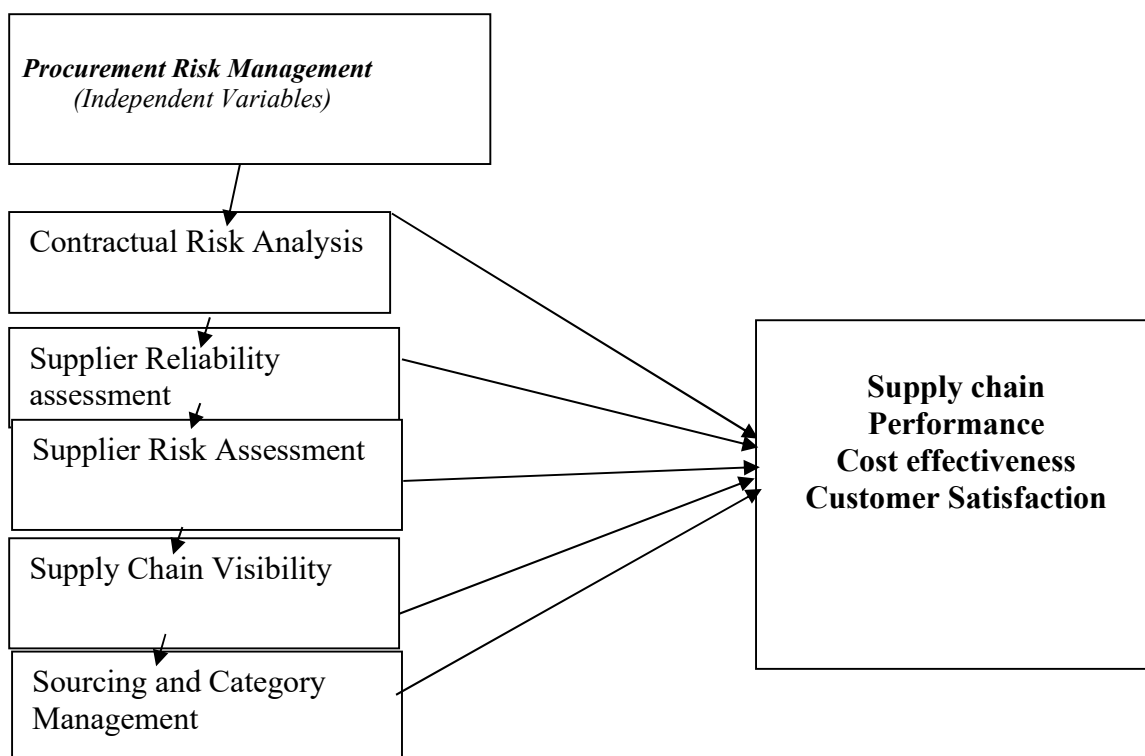

Figure 1: Schematic Diagram of the Study

Source: Researcher's Desk, 2024

PROCUREMENT RISK MANAGEMENT

Procurement risk management is a critical aspect of the procurement process, particularly in the context of project management and public procurement (Mehrad, 2023). The identification and assessment of procurement risks are essential for effective risk management, as highlighted in a study proposing a methodology for assessing the cumulative risk of procurement in the state contract system (Stroganova, 2021). This methodology includes a quantitative assessment of the private risks of all participants at different stages of procurement and the total risk of procurement, using matrix and point approaches. Additionally, a review paper emphasizes the need for sophisticated analysis techniques to manage procurement risks under uncertainty, providing insights into current strategies and future challenges in procurement risk management (Hong. 2018). Moreover, the high occurrence of procurement fraud necessitates the development of comprehensive risk management processes to limit exposure to fraud risks within enterprises (Venter, 2007). According to Waara (2018) there are many dimensions of procurement risk management which includes; contractual risk analysis, supplier reliability assessment, supplier risk assessment supply chain visibility, sourcing and category management practice, procurement fraud risk, resource availability risk and so on. These proxies are discussed in the next paragraph. Contractual risk analysis is essential in procurement risk management, particularly in public procurement, as it helps identify and mitigate risks associated with contractual clauses, external market conditions, and project uncertainties (Kulachinskaya, 2022; Stroganova, 2021). Supplier risk assessment complements supplier reliability assessment by focusing on identifying and managing risks related to single-source suppliers, factory operations, and environmental sustainability (Urbaniak, 2022). Sourcing and category management practices play a crucial role in mitigating procurement risks by strategically selecting suppliers and optimizing cost efficiency across different spend categories (Dixit, 2020). Effective contract management and category-based supplier selection contribute to stronger cross-functional coordination, ensuring procurement decisions align with organizational objectives.

SUPPLY CHAIN PERFORMANCE

Supply chain performance refers to the measurement and evaluation of the effectiveness and efficiency of various processes within the supply chain to achieve organizational objectives. It involves assessing the overall capability of the supply chain in delivering products or services that meet customer expectations while optimizing costs and resources (Mentzer, *et al.,* 2001). Effective supply chain performance is crucial for enhancing competitiveness, customer satisfaction, and overall business success. One key aspect of supply chain performance is its ability to achieve cost efficiency without compromising quality. This includes optimizing the use of resources, minimizing waste, and streamlining processes to reduce operational costs. Supply chain performance is often evaluated through key performance indicators (KPIs) that measure various aspects such as on-time delivery, order fulfillment accuracy, inventory turnover, and lead times (Chopra & Meindl, 2015). Organizations utilize these metrics to monitor and continuously improve their supply chain processes, making data-driven decisions to enhance overall performance. The concept of supply chain performance measurement is crucial for companies aiming to enhance productivity and profitability.

NEXUS BETWEEN PROCUREMENT RISK MANAGEMENT AND SUPPLY CHAIN MANAGEMENT

Procurement risk management is vital for optimizing supply chain performance, particularly in cost efficiency and customer satisfaction (Handfield & Ghosh, 2022). Contractual risk analysis ensures compliance with supplier agreements, mitigating risks that could impact costs and service quality (Cousins & Menguc, 2021). Supplier reliability assessment plays a crucial role in maintaining timely deliveries and consistent quality, reducing disruptions and fostering customer trust (Lee & Richey, 2021). Additionally, supplier risk assessment helps organizations identify financial, geopolitical, and operational risks, allowing for proactive mitigation strategies and diversification to enhance supply chain resilience (Kannan & Tan, 2020). Supply chain visibility further strengthens risk management by enabling organizations to detect inefficiencies, optimize operations, and improve response times, ultimately driving cost savings and reliability (Srivastava & Singh, 2019). Finally, sourcing and category management practices contribute to cost efficiency and quality improvements through strategic supplier partnerships, supplier development programs, and optimized resource allocation, aligning procurement with organizational objectives for continuous supply chain enhancements (Sodhi & Tang, 2018).

REVIEW OF RELATED EMPIRICAL STUDIES

Anyaegbunam and Uzonwanne (2024) examined enhancement of supply chain resilience through procurement risk management. The methodology consist of the use of quantitative survey with procurement managers and production supervisors in Jos, Nigeria, using purposive sampling and SPSS analysis. It was found that procurement risk management positively influenced supply chain performance, improving order fulfillment, cost control, and bottleneck reduction. The study was critique for Reliance on self-reported data may introduce bias, and purposive sampling may not capture all company experiences.

Ogundipe and Bello (2024) examine procurement risk management and supply chain performance in Lagos' sachet water industry. Using stratified random sampling, survey design with 100 participants, and correlation analysis, the study found that supplier evaluation, diversification, and safety stock improved supply chain efficiency and product availability. The

limitation of the study is the use of cross-sectional design which limits causality; longitudinal studies could provide deeper insights.

Wreh and Kamara (2023) in their study on regulatory moderation of procurement risk management in Liberia using a survey of 250 participants, stratified sampling, and PLS-SEM analysis found that procurement risk management improved supply chain performance, but strict regulations weakened its effectiveness. Critique of the study highlights that cross-sectional design used limits causal interpretation; case studies could enhance depth.

Davies and Walker (2023) study on procurement risk management among London table water bottlers using a multi-case study of three London companies, semi-structured interviews, and document reviews. The result shows that diverse supplier relationships and logistics planning improved raw material stability and efficiency. Limited generalizability due to a small sample is the critique for this study; a larger survey is needed.

Konan and N'Guessan (2023) examine procurement risk management in Ivory Coast's Table water industry. Case study of three companies, interviews, and document reviews were used. The result shows that supplier diversification and contingency planning improved supply chain resilience. The study is critiqued for the small sample which limits broader industry insights; quantitative expansion is recommended.

Hassan and Youssef (2023) examined the impact of procurement risk management on supply chain performance in large Egyptian table water bottling companies using a quantitative survey approach analyzing the responses using exploratory factor analysis and multiple regression. The study found a significant positive correlation between procurement risk management and improved supply chain performance, particularly in supplier relationship management, risk mitigation, and contingency planning. However, the reliance on purposive sampling limits generalizability, suggesting that future studies should adopt a broader sampling approach across different company sizes.

Effa, Ovharhe, Ezirim, and Igwe (2023) investigated the influence of strategic procurement initiatives on logistics performance in Nigeria using a cross-sectional and correlation design. A sample of 196 valid responses was analyzed using Pearson Product Moment Correlation in SPSS 25, revealing a strong positive relationship between procurement sustainability initiatives and logistics efficiency. The study emphasized the importance of e-procurement, outsourcing, group purchasing, and just-in-time practices. While the findings are robust, the small sample size limits generalizability, and further research could explore the specific impacts of individual procurement initiatives on logistics performance in greater detail.

Ahmed and El-Gazzar (2022) investigated how sustainability in procurement risk management enhances supply chain performance in Egyptian table water companies using a case study approach. Data from semi-structured interviews and document reviews were analyzed thematically. Findings showed that integrating sustainability in supplier selection led to benefits such as improved brand reputation, customer loyalty, and efficiency. However, the study's focus on only two companies limits generalizability. Future research should expand to a larger sample to explore the broader impact of sustainability-integrated procurement risk management in the Egyptian table water sector.

Du Plessis and Strydom (2022) explored procurement risk management's impact on supply chain performance in South African table water producers using a descriptive research design with 44 employees. Correlation and regression analysis showed purchasing risk-taking positively influenced performance ($r = 0.444$, $p < 0.001$), while strategic purchasing had a negative effect ($r = -0.257$, $p < 0.001$). The study suggests prioritizing risk-taking and training to improve efficiency. However, the small sample size limits generalizability. Future research could include a larger sample or replicate the study in different South African regions for broader insights.

Zwingin, Adegun, and Efanga (2022) analyzed procurement management's impact on Nigeria's Oil and Gas Industry using an ex-post survey with secondary financial data. Results showed a positive but insignificant relationship (coefficient = 6.45, $p = 0.589$) between procurement practices and company performance. The study recommends increased investment in asset acquisition and better departmental integration to enhance efficiency. However, reliance on secondary data limits depth, and future studies using primary data could provide a more comprehensive understanding of procurement's influence on industry performance.

Akwasi (2021) examined the impact of procurement risk management on supply chain performance among sachet water producers in Ghana using a mixed-methods approach. Surveys captured quantitative data on risk management practices and performance indicators, while interviews provided qualitative insights. The study found that effective risk management enhances cost efficiency, delivery reliability, and flexibility, with key risks including price volatility and supplier reliability. However, the limited sample size and focus on quantitative aspects restrict generalizability. Future research should incorporate broader samples and qualitative dimensions for a more comprehensive understanding. Umar, Yusuf, and Ghazali (2021) assessed procurement risk management practices and their effect on sachet water firms in

Kano, Nigeria, using a descriptive survey design with 81 respondents. Data analyzed through regression analysis showed a significant positive relationship ($\beta = 0.521$, $t = 7.256$, $p < 0.05$) between risk management strategies like dual sourcing and improved supply chain performance. While the study provides practical insights, selection bias from convenience sampling and lack of qualitative exploration limit its depth. Future research should use larger samples and mixed methods for a more nuanced understanding.

Dupont (2020) investigated procurement risk management's effect on supply chain performance among French table water producers through a quantitative survey-based approach. Regression analysis confirmed a strong positive relationship between risk management practices and performance, particularly in cost efficiency, delivery reliability, and flexibility. Identified risks included price volatility and regulatory compliance. While valuable, the study's limited sample size and lack of qualitative analysis restrict broader applicability. Future research should integrate qualitative insights to offer a more holistic view of procurement risk management in France's table water industry.

Mensah (2020) examined the influence of procurement risk management on supply chain performance among sachet water producers in Ghana using a mixed-methods approach. Surveys collected quantitative data on risk management practices and performance indicators, while interviews provided qualitative insights. Regression analysis showed a positive relationship between effective risk management and supply chain performance, with key risks including price volatility and supplier reliability. While valuable, the study's limited sample size and focus on quantitative aspects restrict generalizability. Future research should explore qualitative dimensions for a more comprehensive understanding of procurement risk management.

Adigwe (2020) assessed the impact of procurement risk management on the supply chain performance of sachet water producers in Lagos, Nigeria, using a survey-based approach. Regression analysis revealed a positive correlation between procurement practices like supplier evaluation and risk mitigation strategies and improved supply chain performance. However, reliance on self-reported data and the study's geographic limitation to Lagos restrict generalizability. Future research should expand regionally and incorporate qualitative methods such as interviews or case studies for deeper insights into procurement risk management.

Schmidt (2019) investigated procurement risk management's impact on supply chain performance in Germany's table water processing industry using a quantitative survey-based approach. Correlation and regression analyses confirmed a significant positive relationship between procurement risk management and performance metrics like cost efficiency, delivery reliability, and flexibility. Key risks included raw material price volatility and supplier reliability. However, the study's limited sample size and focus on quantitative measures limit broader applicability. Future research should incorporate qualitative aspects to gain deeper insights into procurement risk management within Germany's table water sector.

Kimaiyo & Bichanga (2018) examined the effects of procurement risk management practices on organizational performance in the Kenyan energy sector, focusing on documentation, supply chain frameworks, regulatory frameworks, and separation of duties. Using a descriptive research design, the study surveyed 209 staff from NSE-listed energy firms through stratified sampling, with data analyzed using descriptive and inferential statistics, including regression analysis. Results revealed a significant positive relationship between procurement risk management practices and organizational performance, with all variables showing notable influence. The lack of qualitative data from stakeholders presents a missed opportunity to explore contextual intricacies.

RESEARCH GAP

The gap identified in the literature include inconsistencies in methodologies, the use of ANOVA to estimate effect study, the use of descriptive statistics only as the method of data analysis, no validity and reliability of instrument among other anomalies. The use of wrong research methods leads to misleading conclusion and recommendations. The present study will use the correct research design and methodology to estimate the nexus between the variables of the study.

METHODOLOGY
STUDY DESIGN

The research design employed in this study is a cross-sectional study design. Cross-sectional studies can be broadly categorized into descriptive and analytical types, based on their purpose and focus.

THE STUDY AREA

The study area is Makurdi Metropolis in Makurdi Local Government Area of Benue State. Makurdi Local Government was selected for this study because its cosmopolitan nature surpasses that of other local governments in the region. Makurdi Metropolis is located in the Middle Belt along the Benue River. In 2007, Makurdi had an estimated population of 500,797. As a state capital, it is inhabited predominantly by the Tiv, Idoma and Igede peoples, who speak Tiv, Idoma, and Igede languages respectively. There are other ethnic groups, including the Etulo, Abakwa Jukun, Hausa, Igbo, Igala

people, Akweya and Nyifon. Makurdi Metropolis is home to numerous firms in different sectors of the economy specializing in various goods and services such as table water production.

POPULATION OF THE STUDY
The study population comprised of 169 owners or managers of table water producers in Makurdi Local Government Area.

SAMPLE AND SAMPLING TECHNIQUE
SAMPLE SIZE
In this study, the study population of 169 table water producers in Makurdi, Benue State, Nigeria, was used due to its relatively small and manageable size. Adopting a census approach allowed the researcher to include the entire population, ensuring comprehensive coverage and precision in the study. Given the manageable number of 169 participants, this approach facilitated the collection of complete data from every individual, thereby enhancing the accuracy and reliability of the findings.

SAMPLING TECHNIQUE
Census sampling involves collecting data from every member of the population, rather than selecting a subset. Census sampling technique was utilized, where all 169 respondents representing the entire population of table Water Producers were included in the study. By using the entire population, the study ensured comprehensive coverage of all perspectives, reducing sampling bias and enhancing the reliability of the findings.

INSTRUMENT FOR DATA COLLECTION
The study employed a 4-point questionnaire to assess procurement risk management, chosen for its simplicity and ability to capture varying levels of agreement or perception effectively.

Validity of Instrument
The validity test was carried out to check the ability of the research instrument to measure the variable it is intended to measure. Both content and construct validity were employed. While content validity was tested through the expert contributions from my supervisor and other experts in the field, construct validity was tested with the use of factor analytical tool that considered Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity.

Table 1: Kaiser-Meyer-Olkin and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.916
Bartlett's Test of Sphericity	Approx. Chi-Square	50.194
	df	15
	Sig.	.000

Source: SPSS Version 26 Result, 2024

Legend: SCP = Supply chain performance, CRA = Contractual risk analysis, SRA = Supplier reliability assessment, SUA = Supplier risk assessment, SCV = Supply chain visibility, SCM = Sourcing and category management practice.

To establish the validity of the instrument, a pre-test study was carried out with thirty percent of the total population and the result of the pre-test study was subjected to exploratory factor analysis to determine if the construct is in line with extant literature on the subject matter. Thirty percent of the study population i.e. 1/3 of 169 is fifty-one (51) respondents were used for the pre-test study. The validity of the instrument used in this study was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of sphericity. The results presented in Table 1 demonstrate strong evidence of the instrument's validity. The KMO measure of sampling adequacy yielded a value of 0.916, which is well above the commonly accepted threshold of 0.6. This high KMO value indicates that the sample size is adequate and that the variables have enough common variance to justify factor analysis.

Table 2: Total Variance Explained

Comp	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.523	25.378	25.378	1.523	25.378	25.378	1.445	24.080	24.080
2	1.225	20.414	45.791	1.225	20.414	45.791	1.283	21.384	45.464
3	1.091	18.175	63.966	1.091	18.175	63.966	1.110	18.502	63.966
4	.868	14.469	78.436						
5	.671	11.181	89.617						
6	.623	10.383	100.000						
Extraction Method: Principal Component Analysis.									

Source: SPSS Version 26 Result, 2024

Legend: SCP = Supply chain performance, CRA = Contractual risk analysis, SRA = Supplier reliability assessment, SUA = Supplier risk assessment, SCV = Supply chain visibility, SCM = Sourcing and category management practice.

The instrument's validity is supported by the total variance explained through principal component analysis (PCA), demonstrating that it captures the essential dimensions of procurement risk management. The first three components, with eigenvalues above 1, explain a cumulative variance of 63.966%, which is above the commonly accepted threshold of 60% for a valid measurement instrument. This indicates that the instrument effectively captures a substantial portion of the total variability in procurement-related constructs. The first component, explaining 25.378% of the variance, signifies that supply chain performance (SCP) is a dominant factor, while the second and third components, accounting for 20.414% and 18.175% of the variance, respectively, highlight the significance of contractual risk analysis (CRA) and supplier reliability assessment (SRA). These findings validate the inclusion of these constructs in the instrument, as they contribute significantly to explaining procurement risk variability. However, while the first three components explain the majority of the variance, the remaining components, though having eigenvalues below 1, still contribute meaningful information to the overall instrument validity.

The inclusion of supplier risk assessment (SUA), supply chain visibility (SCV), and sourcing and category management practice (SCM) is essential for ensuring comprehensive construct validity. These constructs account for 14.469%, 11.181%, and 10.383% of the variance, respectively, collectively contributing an additional 36.034% of the total variance. Their inclusion ensures that the instrument adequately captures critical dimensions such as supplier-related risks, transparency in supply chain operations, and strategic procurement management, which are fundamental to procurement risk management. Excluding these constructs would compromise the content validity of the instrument by failing to account for all key dimensions of procurement risks. Therefore, the total variance explained by the instrument supports its validity, affirming that it provides a comprehensive and balanced representation of procurement risk factors and their impact on supply chain performance.

RELIABILITY OF INSTRUMENT

Table 3: Reliability Statistics

Variables	Cronbach's Alpha
Supply chain performance (SCP)	0.794
Contractual risk analysis (CRA)	0.860
Supplier reliability assessment (SRA)	0.891
Supplier risk assessment (SUA)	0.866
Supply chain visibility (SCV)	0.819
Sourcing and category management practice (SCM)	0.895
Overall Cronbach	**0.854**

Source: SPSS Version 26 Result, 2024

Legend: SCP = Supply chain performance, CRA = Contractual risk analysis, SRA = Supplier reliability assessment, SUA = Supplier risk assessment, SCV = Supply chain visibility, SCM = Sourcing and category management practice.

The reliability statistics indicate strong internal consistency across the constructs in the study, as measured by Cronbach's Alpha. A value of 0.7 or higher is generally considered acceptable, and all constructs exceed this threshold, confirming the reliability of the measurement instrument. Supply Chain Performance (SCP) has a Cronbach's Alpha of 0.794, showing consistent responses. Contractual Risk Analysis (CRA) exhibits a strong reliability score of 0.860, indicating that its items

effectively measure the construct. Supplier Reliability Assessment (SRA) has an even higher Cronbach's Alpha of 0.891, reinforcing the robustness of the instrument in capturing supplier reliability. Similarly, Supplier Risk Assessment (SUA) scores 0.866, and Supply Chain Visibility (SCV) records 0.819, further proving the instrument's reliability. Sourcing and Category Management Practice (SCM) has the highest Cronbach's Alpha at 0.895, signifying excellent internal consistency within this construct. The overall Cronbach's Alpha for the entire instrument is 0.854, confirming that the study's measurement framework is highly reliable. These strong reliability statistics suggest that the study's findings are based on stable and consistent data, minimizing measurement errors. Consequently, the study can confidently assess various aspects of supply chain management, including performance, contractual risk, supplier reliability, supplier risk, visibility, and sourcing practices, ensuring the validity and credibility of its conclusions.

DATA COLLECTION

Primary data was collected using close ended questionnaire with 27 questions from the respondents. The instrument was divided into two sections; section A consist of 7 questions on demographic characteristics of the respondents while section B comprised of 20 questions covering contractual risk analysis, supplier reliability assessment, supplier risk assessment, supply chain visibility, sourcing and category management practice and supply chain performance. The questions are close ended with multiple choices to give respondents the opportunities to make a choice among the available options.

MODEL SPECIFICATION

Guided by the nexus between the variables of the study, a functional relationship is established between them. As shown below, the implicit form of the model is shown as:

The mathematical form of the model is:

$$SCP = f(CRA, SRA, SUA, SCV, SCM) \tag{1}$$

Where,

SCP = Supply chain performance
CRA = Contractual risk analysis
SRA = Supplier reliability assessment
SUA = Supplier risk assessment
SCV = Supply chain visibility
SCM = Sourcing and category management practice

In its econometric form, the model is

$$SCP = b_0 + b_1 CRA + b_2 SRA + b_3 SUA + b_4 SCV + b_5 SCM + U_t - \tag{2}$$

Where,

b_0 = Regression Constant
b_1, b_2, b_3, b_4, b_5 = Regression Coefficients
U_t = Error Terms

A priori expectation

Contractual risk analysis, Supplier reliability assessment, Supplier risk assessment, Supply chain visibility, Sourcing and category management practice are expected to have a positive effect on supply chain performance in table water companies in the study area. This is based on theoretical and empirical evidences. As such, we expect our parameter estimates to be positively signed. As regards the magnitude of the effect, there is no empirical or theoretical consensus on it, but we expect a greater effect of 50% and above.

DATA ANALYSIS TECHNIQUES

Data was analyzed using SPSS version 26. Descriptive data were presented as frequencies and percentages. Binary logistic regression was employed to estimate the objectives of the study. Logit regression was chosen for the study to model the likelihood of procurement risk management influencing supply chain performance, especially with binary outcomes, allowing for the estimation of odds ratios and associations. Hypotheses were tested using the probability values of the regression coefficients. The decision rules for hypothesis testing were as follows: If the probability value of the coefficient $p(b_i)$ exceeds the critical value (5% significance level), the null hypothesis is accepted, indicating that the coefficient (b_i) is not statistically significant. Conversely, if $p(b_i)$ is less than the critical value, the null hypothesis is rejected, indicating that (b_i) is statistically significant. The Hosmer-Lemeshow test was conducted as a diagnostic check.

RESULTS AND DISCUSSION

This section is made up of presentation and discussion of the logit regressions results based on the specific objectives of the study. One hundred and sixty nine (169) copies of questionnaire were distributed.

Table 4: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	22.911[a]	.539	.791

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Source: SPSS Version 26 Result, 2024

The model summary table provides key statistics for evaluating the fit of the logistic regression model. The -2 Log Likelihood value is 22.911, indicating the model's overall fit to the data. The Cox & Snell R Square value of 0.539 suggests that approximately 53.9% of the variability in the dependent variable is explained by the model. The Nagelkerke R Square value, which is an adjusted version of the Cox & Snell R Square, is 0.791, indicating a stronger explanatory power, with 79.1% of the variance explained. The estimation terminated at the fourth iteration, as parameter estimates changed by less than 0.001, showing that the model quickly reached stability.

Table 5: Hosmer and Lemeshow Test for Model

Step	Chi-square	df	Sig.
1	8.936	6	.177

Source: SPSS Version 26 Result, 2024

Table 5 presents the Hosmer and Lemeshow Test results which is the most reliable test of model fit available in SPSS. Test poor fit is indicated by a significance value less than 0.05, so to support our model we want a value greater than 0.05. The result of this study shows Chi-square value of 8.936 with 6 degrees of freedom and a significance value of 0.177. This result supports the model of this study, as the p-value is greater than the common alpha level of 0.05, indicating no significant deviation from the expected model fit. In the context of studying the effect of procurement risk management on supply chain performance for Table Water Producers in Makurdi, Benue State, this finding implies that the model used to evaluate the impact of variables such as contractual risk analysis, supplier reliability assessment, and supply chain visibility on supply chain performance is robust and well-suited for the analysis. Therefore, the results derived from this model can be considered reliable in assessing how procurement risk management influences supply chain performance in this specific industry.

Table 6: Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	56.139	5	.040
	Block	56.139	5	.040
	Model	56.139	5	.040

Source: SPSS Version 26 Result, 2024

Table 6 shows result of the Omnibus Tests of Model Coefficients also referred to as goodness of fit test. The result reveals a Chi-square value of 56.139 with degree of freedom of 5 and a significance value of 0.040. This indicates that the model's coefficients collectively have a statistically significant effect on the outcome variable. For the study on the effect of procurement risk management on supply chain performance of Table Water Producers in Makurdi, Benue State, this finding suggests that the variables included in the model such as contractual risk analysis, supplier reliability assessment, and supply chain visibility are significantly influencing supply chain performance. Therefore, the model is effective in capturing the impact of procurement risk management practices on the performance of table water supply chains, implying that these practices are crucial for enhancing supply chain efficiency in this context.

Table 7: Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1ᵃ	CRA	.498	.109	4.567	1	.002	3.645	.738	3.665
	SRA	-.065	.453	.021	1	.885	.937	.386	2.275
	SUA	.553	.212	2.608	1	.018	2.738	.775	3.897
	SCV	.055	.435	.016	1	.899	1.057	.450	2.479
	SCM	-.303	.100	.461	1	.497	.739	.308	1.772
	Constant	.658	.288	3.254	1	.014	2.932		

a. Variable(s) entered on step 1: CRA, SRA, SUA, SCV, SCM.

Source: SPSS Version 26 Result, 2024

Legend: SCP = Supply chain performance, CRA = Contractual risk analysis, SRA = Supplier reliability assessment, SUA = Supplier risk assessment, SCV = Supply chain visibility, SCM = Sourcing and category management practice.

a) Effect of contractual risk analysis on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

The results of this study demonstrated a significant positive effect of Contractual Risk Analysis on supply chain performance among Table Water Producers in Makurdi. This aligns with result of Anyaegbunam and Uzonwanne (2024) which revealed that effective procurement risk management, particularly in contractual aspects, significantly enhanced supply chain performance among table water producers in Jos, Nigeria. Similarly, Ogundipe and Bello (2024) found that supplier evaluation and contractual risk management were important in improving the supply chain efficiency of sachet water producers in Lagos. On the other hand, the result of the current study does not align with the report of Davies and Walker (2023) in their study of table water bottlers in London that found that risk management practices did not have impact on supply chain performance as pronounced due to the unique challenges of operating in a metropolitan market. Similarly, Wreh and Kamara (2023) noted that in Liberia, the effectiveness of procurement risk management was moderated by government regulations, weakening the direct impact on supply chain performance. Konan and N'Guessan (2023) also observed that in Ivory Coast, the application of procurement risk management practices did not uniformly translate to improved supply chain outcomes, suggesting contextual factors play a significant role. This result highlights the critical role of effective Contractual Risk Analysis in enhancing the supply chain performance of Sachet Water Producers in Makurdi, suggesting that robust management of contractual risks can lead to significant improvements in supply chain outcomes.

b) Effect of supplier reliability assessment on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

Result of this study reveal that Supplier Reliability Assessment (SRA) does not significantly affect the supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria. This contradicts the results of Hassan and Youssef (2023) similarly demonstrated a positive association between effective procurement risk management, including supplier relationship management, and enhanced supply chain performance among large Egyptian table water bottlers. Conversely, the current study aligns with findings of Ahmed and El-Gazzar (2022) who found that integrating sustainability into procurement practices had a more substantial impact on supply chain performance than traditional risk management practices, suggesting that factors beyond supplier reliability can drive performance. This study's result also aligns with the observation by Ahmed and El-Gazzar that the impact of traditional procurement risk management might be less significant in certain contexts, as sustainability and other innovative practices gain prominence. This study highlights the potential limitations of applying general procurement risk management principles across different industries and regions. It suggests that factors other than supplier reliability may play a more critical role in determining supply chain outcomes in table water industry in Makurdi.

c) Effect of supplier risk assessment on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

The findings of this study revealed a significant positive impact of Supplier Risk Assessment (SUA) on the supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria. This result aligns with the result reported by Du Plessis & Strydom (2022) that effective procurement risk management practices, including supplier assessment, positively correlated with improved supply chain metrics such as lead times and inventory turnover in the South African table water industry. Similarly, Akwasi (2021) observed that procurement risk management enhanced supply chain performance in the Ghanaian sachet water sector, specifically through cost efficiency and delivery reliability. Also, Umar, Yusuf & Ghazali (2021) identified a positive relationship between procurement risk management and performance outcomes like delivery timeliness and production efficiency in Kano State, Nigeria. However, this result contradicts the

result reported by Zwingin, Adegun, and Efanga (2022) that while procurement management practices were positively related to company performance in Nigeria's Oil and Gas Industry, the relationship was statistically insignificant. This contradiction may be due to difference in sector studied. Moreover, Kimaiyo and Bichanga (2018) in Kenya reported qualitative evidence that, while positive, did not conclusively demonstrate the same quantitative significance in the relationship between procurement risk management and supply chain performance as the current study.

d)Effect of supply chain visibility on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

The findings of the current study on the effect of Supply Chain Visibility (SCV) on supply chain performance among table water producers in Makurdi, Benue State, Nigeria, shows that SCV does not significantly influence performance outcomes. This result does not align with the reports by Dupont (2020), and Mensah (2020), who found a positive relationship between procurement risk management practices, including SCV, and supply chain performance in their studies These studies highlighted that effective risk management, including enhanced visibility, leads to improved cost efficiency, delivery reliability, and flexibility. However, the findings of the current study align with the report by Schmidt (2019) examined similar contexts but found that SCV did not have a statistically significant impact on supply chain performance.

e)Effect of sourcing and category management practice on supply chain performance of Table Water Producers in Makurdi, Benue State, Nigeria

Sourcing and Category Management Practice (SCM) was revealed not to be a significant predictor of supply chain performance among table water producers in Makurdi, Benue State, Nigeria. This aligns with the reports by Anyaegbunam and Uzonwanne (2024) on table water producers in Jos, Nigeria, and Ogundipe and Bello's (2024) research in Lagos where there was a positive correlation between procurement risk management practices and supply chain performance, particularly highlighting the importance of strategies like supplier evaluation and diversification. However, these studies support the idea that while SCM can be beneficial, its impact may be context-dependent and not universally significant across different regions or industries. Similarly, Wreh & Kamara (2023) observed a positive relationship between procurement risk management and supply chain performance among sachet water producers in Liberia, though their study also indicated that government regulations could moderate this relationship, potentially diminishing the impact of SCM practices. Conversely, this result contradicts the report by Davies and Walker (2023)   that tailored procurement risk management practices, including SCM, significantly improved supply chain efficiency for table water bottlers in London, especially in complex metropolitan markets. Adigwe (2020) and Osei (2018) also reported significant positive relationships between procurement risk management practices and supply chain performance in sachet water production contexts in Lagos, Nigeria, and Ghana, respectively. These studies emphasized that effective SCM practices, such as supplier evaluation, contract management, and risk mitigation strategies, contributed to better on-time delivery, inventory management, and overall production efficiency. The divergence in the findings underscores the varying impact of SCM across different regions and industries, suggesting that local factors, such as market dynamics and regulatory environments, play a critical role in determining the effectiveness of SCM practices.

This study introduces new thinking by challenging the conventional wisdom that SCM is a universally critical factor for supply chain performance. Unlike previous studies that broadly assert the importance of SCM across various contexts, this research suggests that its impact may be negligible or non-significant in certain settings, such as the table water industry in Makurdi.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The study on the effect of procurement risk management on the supply chain performance of table water producers in Makurdi, Benue State, Nigeria, reveals critical perspectives into the elements that significantly influence performance outcomes. The study concludes that effective management in these areas appears to be vital in enhancing the efficiency and resilience of supply chains, contributing to better overall performance in the table water industry. Conversely, the study also identifies areas where risk management practices may not significantly impact supply chain outcomes. In particular, supplier reliability and visibility practices have minimal influence on performance in this study. This suggests that while these practices are generally considered important in supply chain management, they may not be the key drivers of performance improvements for table water producers in this region. The results imply that other factors, possibly specific to the local context, could be more influential in determining supply chain success. The study emphasizes that not all procurement risk management practices contribute equally to supply chain performance.

RECOMMENDATIONS

Based on the findings of the study the following recommendations are made:

i. Given the significant impact of CRA on supply chain performance, it is recommended that table water producers in Makurdi prioritize and enhance their contractual risk analysis processes. By developing robust contract management

strategies and regularly reviewing and updating contracts, producers can better safeguard against potential risks, leading to improved supply chain outcomes.

ii. Manufacturers should consider reallocating resources from comprehensive reliability assessments to other aspects of risk management that have a more immediate impact on performance, as SRA has minimal effect on supply chain performance. Nevertheless, it is advisable to maintain a fundamental level of check on supplier reliability to ensure the consistent quality of supplies.

iii. Due to the substantial impact of SUA on supply chain performance, it is advisable for companies to adopt comprehensive supplier risk management measures. This may involve conducting periodic risk assessments, creating contingency plans, and implementing supplier development programs in order to minimize potential risks and enhance the overall resilience of the supply chain.

iv. Since the study found that SCV did not have a significant impact on supply chain performance, producers should consider investigating other elements that could more effectively improve performance. Nevertheless, it is crucial to uphold fundamental supply chain transparency to enhance operational effectiveness, and allocations towards this domain should be harmonized with other vital risk management strategies.

v. Given the limited influence of SCM techniques on performance in this particular situation, it is advisable for producers to prioritize other areas of risk management that are more likely to lead to performance enhancements. Producers should explore the possibility of incorporating Supply Chain Management (SCM) principles into their overall strategy objectives to determine if a more comprehensive approach produces superior outcomes.

CONTRIBUTION TO KNOWLEDGE

This study contributes to knowledge by providing empirical evidence on the relationship between procurement risk management practices and supply chain performance in the table water production industry in Makurdi, Benue State. It contextualizes theories like Modern Portfolio Theory (MPT) and Transaction Cost Economics (TCE), bridging the gap between general risk management principles and their specific applicability to small-scale industries in developing regions. The research employs logit regression analysis, offering actionable insights into how practices such as supplier diversification and supply chain visibility enhance performance. Additionally, the study develops and validates a tailored questionnaire, enriching methodological tools for similar research. Thus, focusing on the unique challenges of table water producers in Makurdi, it informs local policy, industry practices, and academic discourse, contributing to enhanced supply chain resilience and efficiency. Also, the finding of this study will add to the dearth of information on this area for future researchers, government, table water producers and policy makers.

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