

Environmental Scanning and its Influence on Performance of Water Service Providers in the Lower-Eastern Counties of Kenya

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Abstract

This study examined the influence of environmental scanning on performance of Water Service Providers (WSPs) in the Lower-Eastern counties of Kenya. The research problem focused on persistent operational inefficiencies within the sector, particularly Non-Revenue Water (NRW) quantified above 45% (Water Services Regulatory Board [WASREB], 2022), resulting in significant economic losses and constraining Kenya's agricultural developmental potential. The core issue identified is that WSPs operate in a complex, dynamic environment but often lack systematic environmental intelligence for proactive strategic decision-making. The Null Hypothesis (H01) was that environmental scanning does not significantly influence performance of water service providers in the Lower-Eastern Counties of Kenya. The study was anchored on the Resource-Based View (RBV) theory, which posits that a firm's unique internal resources and capabilities are primary sources of superior performance and sustainable competitive advantage. The study adopted a descriptive survey design grounded on positivist philosophy. Data was collected using self-administered questionnaires issued to 183 respondents sampled non-probabilistically out of 758 in ten entities using the Yamane's formula. The returned 154 questionnaires translated to 84.2% response rate. Descriptive and inferential data analysis using SPSS indicated that environmental scanning significantly and positively influences performance ($\beta=0.473$, $P<0.05$). Further, $R^2 = 0.253$ confirmed that environmental scanning alone explains 25.3% of the variance in organizational performance of WSPs. WSPs effectively monitored customer needs and regulatory changes, but their scanning of technological trends and competitor activities is limited. Consequently, it is recommended that WSPs invest in comprehensive environmental scanning systems, particularly in technological and competitiveness scanning, and develop analytical capabilities to transform environmental data into actionable strategies for better operational efficiency and improved service delivery. Future research should pursue longitudinal studies and comparative analyses across different regions.

Keywords: *Environmental Scanning, Water Service Providers, Organizational Performance, Strategic Management, Lower-Eastern Kenya*

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1.0 Introduction

Water service providers (WSPs) play a fundamental role in ensuring effective distribution of water from various source to end users. Performance of WSPs is primarily measured by their ability to supply reliable, adequate, quality, and affordable water to communities. However, these organizations face numerous challenges in meeting water demand effectively. A critical yet often overlooked challenge is the global limitation of potable water sources, which is further constrained by quality degradation through chemical and microbial pollutants (Botkin & Keller, 2021).

Environmental scanning represents a systematic approach for organizations to monitor, collect, and analyse information from their operating environment to identify opportunities and threats that could influence strategic decision-making (Albright, 2021). This strategic management practice enables organizations to proactively respond to environmental changes rather than reacting as challenges emerge. As Water Service Providers (WSPs) operate in dynamic regulatory, technological, and socio-economic environments, environmental scanning is crucial for their operational effectiveness and sustainable competitive advantage.

In Kenya, Non-Revenue Water (NRW) exceeds 45% (WASREB, 2022), resulting in annual revenue losses of approximately Kshs 15.8 billion (Mawia & Kalunda, 2021). This figure is significantly higher than the global water loss estimated at 35% (Nono et al., 2024). As existing water shortage is exacerbated by distribution losses which are within the control of WSPs, there is urgent need for improved operational efficiency through enhanced environmental scanning and strategic responsiveness.

Kenya's agriculture-based economy suffers from low productivity partly due to inadequate water supply services. This challenge is more pressing as Kenya strives to achieve its Vision 2030 goal (Government of the Republic of Kenya, 2020) of becoming a newly industrializing middle-income country which inevitably increases water demand. Effective environmental scanning can enable water service providers to anticipate demand patterns, regulatory changes, and technological innovations that could enhance service delivery capabilities.

Countries like Israel and Saudi Arabia, despite having limited water resources have achieved remarkable water security through innovative environmental monitoring systems and effective strategic responsiveness (Organisation for Economic Co-operation and Development [OECD], 2023). Similarly, South Africa, categorized as a water-scarce country like Kenya, provides better water supply though below 1000m³ per capita annually (Molobela & Sinha, 2021) compared to Kenya as classified by the United Nations Environment Programme (United Nations Environment Programme [UNEP], 2022).

The global phenomenon of water sector overregulation affects operational efficiency, particularly when environmental intelligence systems are inadequate. In Africa particularly, water utilities operate with limited control over their operational scope (Mbuvi, 2020), functioning within predefined licenses and jurisdictions to serve diverse interests including geographic equalization and standard of living considerations. Environmental scanning enables these organizations to navigate complex regulatory environments more effectively.

Water sources in Lower-Eastern Kenya primarily include rivers and water springs, which are

unevenly distributed across the region. Rainwater, which represents a more dependable source in terms of quality (Gakungu, 2021; WHO, 2022), remains grossly underexploited. This suggests that factors beyond water source availability contribute to the poor performance of WSPs in Lower-Eastern Kenya.

The performance of WSPs is a nationwide challenge, particularly due to high NRW rates, with Nairobi recording over 47% (The World Bank Group, 2022). Kenya's water coverage of 60% (WASREB, 2022) significantly lags behind Latin American cities such as Lima (91%), Panama (92%), Quito (97%), and San José (100%). Systematic environmental scanning could provide critical insights to addressing performance gaps.

“Statistical analysis revealed that WSPs in Lower-Eastern Kenya demonstrate varying levels of environmental scanning”

Environmental Scanning

Environmental scanning concerns establishing internally and externally known and un-known factors that could impact the status and objectives of an organisation. This is done mainly through SWOT analysis and more effectively when all stakeholders participate in finding hidden opportunities and threats to the organization considering that inclusivity creates trust, loyalty and confidence among employees. Environmental scanning critically involves systematic collection and analysis of information about external environmental factors that could influence

organizational performance (David & David, 2022).

This process encompasses monitoring of political, economic, social, technological, environmental, and legal (PESTEL) factors that shape organizational operating contexts. For WSPs, environmental scanning enables proactive identification of regulatory changes, technological innovations, customer preference shifts, and competitive dynamics that could impact service delivery effectiveness. This provides early warning signals vital for monitoring specific environmental trends for effective forecasting and assessing implications for organizational strategy (Wheelen et al., 2023).

Research has demonstrated that organizations with sophisticated environmental scanning capabilities achieve comparatively, superior performance (Albright, 2021) resulting from enhanced strategic decision-making, improved resource allocation, and increased organizational responsiveness to environmental changes.

Performance and its Measurement

Organizational performance represents a multidimensional concept that remains fluid in definition (Ogolla, 2020). In business contexts, performance can be considered a comparative measure of an organization's financial or non-financial success. Financial success is typically gauged through metrics such as profit, Return on Assets (ROA), and Return on Equity (ROE) (Ngure et al., 2022). Non-financial success encompasses market share, customer base, satisfaction, and loyalty, which are often subjective and qualitative metrics (Kairu, 2022).

Financial measurements are both inward-looking using longitudinal data, and outward-looking using cross-sectional data for benchmarking

against other firms to assess competitiveness. Balanced Scorecard (BSC) facilitates holistic performance measurements by incorporating multiple dimensions including financial, customer, internal process, and learning and growth perspectives (Senaji & Ogolla, 2021). WSPs performance measurement requires sector-specific metrics considerations including water quality standards, service coverage expansion, customer satisfaction levels, operational efficiency, and financial sustainability indicators. BSC embraced in this study suffices for comprehensive assessment of organizational performance based on these metrics.

Water Demand

Global water usage is distributed approximately 50% for agriculture, 40% for industrial, and 10% for domestic uses, but these proportions vary according to regional economic development and activities (Molobela & Sinha, 2021). Nevertheless, WSPs seldom meet water demand for these functions (The World Bank Group [WB], 2022; WASREB, 2022). Uneven global distribution of water sources and contamination during transit between sources and consumption points compound the supply problem. Effective environmental scanning can enable WSPs to anticipate the dynamic factors affecting water demand and take proactive strategic actions.

Statement of the Problem

Kenya's economic is founded strongly on agriculture yet inadequate water supply significantly constrains the exploitation of the country's agricultural potential. Atheru et al. (2021) revealed that 92% of Meru County residents experience domestic water scarcity (Kenya National Bureau of Statistics [KNBS], 2022). This finding illustrates the critical challenge facing a region whereby agriculture

depends primarily on seasonal rainfall and limited water distribution infrastructure. The NRW exceeding 45% in Kenya strongly indicates operational inefficiency and suboptimal organizational performance within the water sector. The significant economic losses arising from this problem suggest inadequate environmental intelligence to support effective decision-making and strategic positioning.

WSPs in Lower-Eastern Kenya operate in an increasingly complex dynamic environment characterized by rapid regulatory changes, technological innovations, climate variability, and evolving customer expectations. Limited environmental scanning capabilities inhibits organisation's ability for monitoring and analysing the impacts of the dynamic environment to facilitate identification of strategic opportunities, anticipate operational threats, and develop adaptive strategies necessary for improved performance. The central premise of this study is that comprehensive environmental scanning could substantially improve WSPs' performance outcomes. This hypothesis is supported by real examples of water-scarce countries that have achieved remarkable improvements in water service delivery through enhanced strategic responsiveness. This research therefore examines the influence of environmental scanning on the performance of water service providers in the Lower-Eastern counties of Kenya, aiming to identify how systematic environmental scanning can enhance organisational performance.

Objective and Hypothesis of the Study

The specific objective of the study was to determine the influence of environmental scanning on performance of water service

providers in the Lower-Eastern counties of Kenya. Accordingly, the Null Hypothesis was:

H₀₁: Environmental scanning does not significantly influence performance of water service providers in Lower-Eastern, Kenya.

2.0 Materials and Methods

Theoretical Orientation

This study is anchored on the Resource Based View (RBV) theory. RBV was originally propounded by Penrose in 1959 (cited by Nyagaki et al., 2021 & Mbithi et al., 2024) and subsequently developed by Barney in 1991 (as cited by Riungu, 2023 & Keroti, 2022). The theory posits that firms are internally heterogeneous entities that differ fundamentally because each organization possesses distinctive bundles of resources including skills, capabilities, and tangible assets. The strategic application of these unique resource configurations distinguishes each firm's performance level and competitive positioning within the market (McGee et al., 2022). The theory further suggests that sustainable competitive advantage emanates from resources that exhibit four critical characteristics: they must be valuable, rare, inimitable, and non-substitutable, collectively termed VRIN attributes (Mbithi et al., 2024). The principal argument of RBV maintains that organizations possessing VRIN resources can achieve superior performance and sustained competitive advantage over competitors lacking such resources (Nyagaki et al., 2021). The theory emphasizes that primarily, internal resource optimization rather than external market positioning determines organizational success.

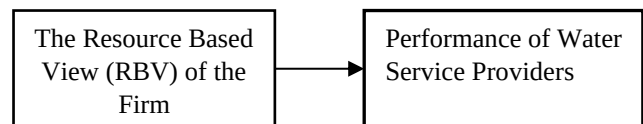
RBV is particularly relevant to this study because WSPs in the region of study operate within similar regulatory environments and serve comparable

markets, yet demonstrate varying performance levels. Water as a natural resource has VRIN characteristics, but it is generally available to all regional entities. However, the theory suggests that competitive advantage derives from how organizations strategically configure and deploy their unique resource combinations which include environmental scanning capabilities. Thus, development and systematic deployment of superior environmental scanning capabilities can provide and organisation sustainable competitive advantage particularly if those capabilities exhibit VRIN characteristics. Water service providers can differentiate themselves through superior environmental intelligence systems, analytical capabilities, strategic responsiveness, and organizational learning processes for better service delivery, operational efficiency, and financial performance while operating in identical environments.

The Theoretical Framework of this study is shown in Figure 1.

Figure 1

Theoretical Framework



Empirical Review

Research by Albright (2021) examining environmental scanning practices in utility organizations found that systematic environmental monitoring significantly influences operational and financial performance. Further, David and David (2022) assessed the relationship between environmental scanning intensity and organizational performance in service organizations and revealed that firms that implemented comprehensive environmental

scanning processes achieved better operational and financial performance compared to those with limited environmental intelligence capabilities. Wheelen et al. (2023) conducted research on strategic management practices in developing countries, focusing on environmental scanning's influence on performance and revealed that organizations with well-developed and integrated environmental scanning systems achieved enhanced performance in adaptability, resource allocation, and competitive advantage.

Shaban (2021) concluded that environmental analysis significantly influences performance of government funded projects in Taveta Constituency and emphasised the value of undertaking environmental analysis before making strategic decisions.

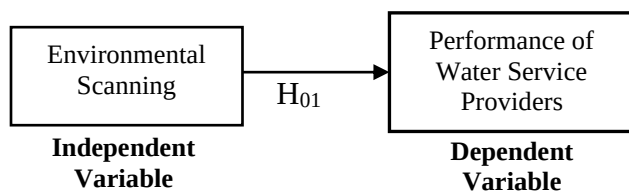
Balanced Score-Card (BSC) has been rated as a modern and reliable tool for investigating performance.

The Conceptual Framework

The Conceptual Framework of the study is exhibited in Figure 2.

Figure 2

The Conceptual Framework



Research Methodology

This was descriptive survey research anchored on positivist philosophy. Mixed-methods of data collection using semi-structured questionnaires was adopted. A total of 183 questionnaires were distributed and 154 returned resulting in 84.2% response rate.

3.0 Results and Discussion

Descriptive and inferential data analysis was conducted using SPSS Version 21.

Demographic Characteristics

The demographic characteristics were analysed to ascertain diversity of the population in the organisations reviewed.

Reliability Analysis

Cronbach's Alpha values obtained for Environmental Scanning (0.896) and performance (0.886) exceeded the rejection threshold of 0.6. Mugenda (2008) considers reliability coefficients above 0.8 to indicate high degree of data reliability.

Descriptive Analysis

Descriptive statistics summarize and organize data using statistical measures including mean and standard deviation, providing insights into patterns, trends, and distributions within the dataset. Accordingly, respondents were asked to select scores for each statement on a five-point Likert's scale from 1 to 5, where Strongly Disagree (SD) was represented by 1 and Strongly Agree (SA) by 5. Continuous grouped scales were created such that: Strongly Disagree (1.0-1.8), Disagree (1.8-2.6), Neutral (2.6-3.4), Agree (3.4-4.2), and Strongly Agree (4.2-5.0).

Descriptive Statistics on Environmental Scanning

Respondents replied to 14 statements in the questionnaire based on the five-points Likert's scale and the results are in Table 1.

Table 1

Descriptive Statistics on Environmental Scanning

Statement soliciting a response	Number	Minimum	Maximum	Mean	Std. Deviation
Information is regularly gathered in the environment based on customer views and suggestions	154	1	5	3.70	.928
There is adequate personnel who gather information needed by the organization	154	1	5	3.43	1.007
Staff are often trained on how to obtain relevant and quality information from clients	154	1	5	3.43	1.083
There are adequate tools to collect required data	154	1	5	3.20	.963
Meetings are often conducted to evaluate usefulness of new market information	154	1	5	3.49	1.048
Information gathered helps the organization to understand the market better	154	1	5	3.79	.994
Information obtained from the environment enables the formulation of superior strategies	154	1	5	3.80	.909
New strategies are always based on information collected from the environment	154	1	5	3.64	.953
Data is used to revise company strategies regularly	154	1	5	3.78	.891
The organization regularly benchmarks with other water service providers in the region	154	1	5	3.31	1.175
Over time, the company has built reliable water supply sources to avoid rationing / water shortages	154	1	5	3.38	1.041
Water supply lines are continually monitored to ensure they are serving company customers well	154	1	5	4.34	.790
The company has accumulated adequate experience on how to serve its customers better	154	1	5	4.08	.818
Company customers often rate the company's services highly	154	2	5	3.74	.787
Valid N (listwise)	154				

All the 154 respondents answered the 14 questions. 11 statements were answered affirmatively each emerging with mean scores above 3.4. The other three questions received mean scores between 3.2 and 3.38, which fall within the neutral range (2.6–3.4) on the study's categorization scale, reflecting uncertain or mixed perceptions rather than disagreement. Since most

statements received highly positive scores then, the respondents overwhelmingly agreed with the statements under this variable.

Descriptive Statistics on Performance

The results of 17 statements on performance are in Table 2.

Table 2

Descriptive Statistics on Performance

Statement soliciting a response	Number (N)	Min	Max	Mean	Std. Deviation
In the last five years, customer feedback has been positive and are satisfied with the organization's services	154	1	5	3.36	0.906
Customer complaints have reduced in the last five years	154	1	5	3.59	0.933
In the last five years, number of customers in the organization has increased	154	1	5	4.08	0.921
In the last five years, more customers have been connected as planned	154	1	5	3.86	0.871
In the last five years, the organization has been making good profits	154	1	5	3.07	1.109
In the last five years, revenue collected by the organization has increased	154	1	5	3.47	1.017
In the last three years, the organization's audited accounts have shown high ROA	154	1	5	3.15	0.975
In the last three years, the organization's audited accounts have shown high ROE	154	1	5	3.16	0.887
The organization finances most of its operations from revenue collected	154	1	5	4.16	0.852
In the last five years, the geographical area served by the organization has expanded significantly	154	1	5	3.82	0.896
The organization is able to finance its capital expenditures without taking loans	154	1	5	3.09	1.157
In the last five years, the organization's employee base has increased.	154	1	5	3.47	1.024
In the last five years, the organization has acquired latest equipment and technology	154	1	5	3.25	1.056
The organization's latest equipment and technology has greatly helped improve its customer service	154	1	5	3.35	1.013
In the last five years, the organization's research funds have been increasing over time	154	1	5	2.90	1.074
In the last five years, the organization has diversified and expanded its water supply sources	154	1	5	3.42	0.995
In the last three years, the organization has diversified its water products and uses	154	1	5	3.21	1.095
Valid N (listwise)	154				

The 154 respondents reacted to the 17 statements and 9 of 17 statements had mean values between 2.9 and 3.36, which fall within the neutral range (2.6–3.4) on the study's categorization scale, indicating that respondents were largely uncertain

or held mixed views about these performance dimensions rather than disagreeing with them.

Further, descriptive statistics revealed that high Non-Revenue Water (NRW) arising from old infrastructure, pipe leakages, illegal connections

and water bill defaulters resulted in low water service delivery.

Inferential Analysis

Inferential analysis examines the relationship between environmental scanning and performance

outcomes using correlation and regression analyses. The results of Pearson correlation analysis on the relationship between environmental scanning and organizational performance are in Table 3.

Table 3

Correlation Coefficient (r) for Environmental Scanning (Variable X_1).

Model	R	R Squared	Adjusted R Squared	Std. Error of the Estimate
1	.503a	.253	.248	.51322

a. Predictors: (Constant), X_1

The correlation coefficient ($r = 0.503$, $p < 0.001$) indicates a moderate to strong positive relationship between environmental scanning and organizational performance. The coefficient of determination ($R^2 = 0.253$) shows that 25.3% of performance variation can be explained by environmental scanning practices, while the adjusted R^2 of 0.248 accounts for sample size and model complexity. These results indicate a significant positive correlation between environmental scanning and performance, suggesting that organizations with superior environmental scanning capabilities tend to achieve better performance outcomes.

Bivariate Regression Analysis was conducted to confirm whether the independent variable significantly influences the dependent variable. The model for this analysis was represented by the general formula: $Y = \beta_0 + \beta_i X_i + \varepsilon$

where Y is the dependent variable; β_0 is the constant; β_i is the regression coefficient showing the level of change influenced to Y by the independent variable X_i and ε is the statistical error arising from sampling. For this formula $i=1$ since there is only one independent variable. The outcome of Bivariate Regression Analysis for Environmental Scanning (X_1) are in Table 4.

Table 4

Regression Coefficient (β) for Independent Variable X_1

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.707	.246		6.937	.000
	X_1	.473	.066	.503	7.123	.000

a. Dependent Variable: Y

Regression Coefficient (β) being positive 0.473 at $p=0.000$ meant that performance of water service providers had positive relationship with environmental scanning. Thus, a positive variation of environmental scanning resulted in

0.473 proportionate positive change in performance. Thus, the specific formula for the model becomes: $Y = 1.707 + 0.473X_i + \varepsilon$.

The ANOVA results in Table 5.

Table 5

ANOVA F-Statistics for Independent Variable X_1

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.363	1	13.363	51.735	.000 ^b
	Residual	39.509	152	.263		
	Total	52.872	153			

a. Dependent Variable: Y

b. Predictors: (Constant), X_1

The ANOVA results in Table 5 indicate that the regression model is statistically significant ($F = 51.537$, $p < 0.001$), demonstrating that environmental scanning significantly affects organizational performance at the 0.05 significance level.

From the foregoing findings, the Null Hypothesis H_{01} was rejected and the alternative hypothesis H_{a1} was accepted as a confirmation that environmental scanning significantly and positively influences performance of water service providers in the Lower-Eastern counties of Kenya.

4.0 Conclusion

Statistical analysis revealed that WSPs in Lower-Eastern Kenya demonstrate varying levels of environmental scanning sophistication across different environmental dimensions. The empirical analysis of the study established that environmental scanning significantly influences performance of WSPs in Lower-Eastern Kenya. Thus, utilities with advanced environmental scanning capabilities achieve superior outcomes in service delivery, operational efficiency, and financial sustainability. Nevertheless, the full effect of environmental scanning is not realised by the entities due to partial inclusivity of stakeholders during environmental scanning exercise. Further, organisational performance is hampered by high Non-Revenue Water (NRW) due to operational inefficiencies resulting in poor water service delivery. Finally, while WSPs

demonstrated proficiency in monitoring regulatory changes and customer needs, the research identifies critical deficiencies in tracking technological trends and competitor activities. These gaps represent substantial strategic vulnerabilities in a dynamic sector. The findings affirm the theoretical propositions of the RBV, positioning environmental scanning as a valuable strategic capability that enhances organizational performance.

5.0 Recommendations

To Water Service Providers (WSPs)

WSPs should embrace environmental scanning practices and establish comprehensive environmental intelligence systems to systematically monitor competitive, technological, and industry developments and ensure high inclusivity of stakeholders in their strategic planning processes. WSPs need to strengthen strategic responsiveness by creating mechanisms for rapidly translation of environmental intelligence into actionable strategies, supported by cross-functional implementation teams and performance monitoring systems to evaluate strategic effectiveness. They should diversify water sources to supplement the current ones and cut NRW to below 20% for better performance

On Areas for Further Research

A replication of the study using longitudinal designs and in another region in Kenya.

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