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The Effect of Green-Technology Application on Financial Performance of Accredited Hospitality Facilities in Kenya

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Abstract

Purpose: The study investigated the effect of green-technology application on financial performance of accredited hospitality facilities in Kenya. The study particularly examined the effect of energy-efficient appliances, water-efficient appliances and waste management appliances on financial performance of accredited hospitality facilities in Kenya.

Methodology: Anchored on resource-based view and Porter's Competitive Advantage theories, a quantitative approach with a cross-sectional survey research design was used to collect and analyze data. A sample size of 216 respondents from 449 targeted hospitality facility managers was obtained via stratification and proportionate sampling technique.

Findings: The findings revealed that green-technology application has a significant positive effect on financial performance of accredited hospitality facilities. The energy-efficient appliances had the strongest effect ($\beta = .354$, $t = 5.73$, $p < .001$) on financial performance of accredited hospitality facilities, followed by waste management appliances ($\beta = .315$, $t = 5.17$, $p < .001$) and water-efficient appliances ($\beta = .230$, $t = 3.81$, $p < .001$).

Unique Contribution to Theory, Policy and Practice: The study isolates the relative financial effect of water-efficient, energy-efficient and waste management appliances empirically, hence advancing the Resource-Based View and Porter's Competitive Advantage. This establishes a hierarchy of strategic value among green technologies in hospitality facilities. Also, the study gives evidence-based justifications for government agencies and regulators to incentivize energy-efficient technologies, embrace public-private partnerships for training, encourage sustainability standards and align hospitality operations with national sustainability goals. Hospitality managers get actionable guidance from the study to prioritize energy-efficient appliances for immediate financial benefits while integrating water and waste management technologies as a strategic lever for long-term financial performance and competitiveness.

Keywords: Accredited Hospitality Facilities, Green-Technology Application, Financial Performance, Developing Economy, Kenya.

Introduction

The tourism and travel sector provided 9.1% of the global Gross Domestic Product (GDP) and directly generated 27 million additional jobs, and increased domestic and international visitor spending by 18.1% and 33.1%, respectively, in 2023 (*World Travel & Tourism Council (WTTC)*, 2024). The WTTC report of 2024 also highlights how hotel occupancy rates have risen globally over the last three years in the majority of regions. In Africa, average hotel occupancy rate reached 54% in 2023, compared to 25% in 2021 and 39% in 2022 (Galal, 2024). In Kenya, the occupancy rate reached 53% in 2023 (*Kenya National Bureau of Statistics (KNBS),* 2024). This resulted in an increase in visitor spending and an increase in the hospitality sector's contribution to GDP growth by 26% in the third quarter of 2023 compared with 2022 when the sector's value added was approximately 17% (KNBS, 2024). Despite a significant increase in visitor spending by both domestic and international tourists and increase in occupancy rates, in the previous few years to 2023, the increase in occupancy rates has not been reflected in the net earnings of hospitality facilities (Gooroochurn, 2022; Kapil & Varghese, 2024; Luís et al., 2024). How to increase financial performance of these hospitality facilities through green-technology application has become a major issue for their sustainable performance. Green-technology applications have grown in popularity in the hospitality industry, with leading hotel chains, such as Hilton, incorporating these technologies to minimize waste and save energy and water (Legrand et al., 2016). Green-technologies are increasingly being incorporated into hotel operations in Africa as a means of reducing energy costs, saving water, and minimizing waste to increase a hotel's overall performance (Nwokolo et al., 2024). Studies in Nigeria and Botswana show that renewable energy technologies such as biogas and solar energy are being adopted in hotels to reduce their carbon footprint, save costs, improve guest satisfaction, and differentiate themselves in the industry (Mahachi et al., 2015; Sonubi et al., 2015). In this context, green technologies have become essential factors for hospitality facilities to reduce operational costs, improve market competitiveness and act as strategic resource in adapting to external changes (Bano et al., 2024). However, whether green-technology application can effectively improve the financial performance of accredited hospitality facilities needs further empirical research.

1. To examine the effect of green-technology application on the financial performance of accredited hospitality facilities: Via empirical research, assess whether green-technology application can effectively improve the financial performance of accredited hospitality facilities.
2. To give practical guidance for the green-technology application of accredited hospitality facilities: Based on the study findings, suggest targeted strategies and proposals to assist accredited hospitality facilities effectively enhance their financial performance.

Through these research goals, this research aimed at providing theoretical support and practical references for the green-technology application of accredited hospitality facilities, provide a

foundation for policymakers to optimize related support policies and promote sustainability initiatives for hospitality facilities in the current competitive era.

Literature review and research hypotheses

Financial performance is an essential aspect in the study of hospitality management because financial stability significantly influences the competitiveness and overall success of hospitality facilities (Almashhadani & Almashhadani, 2023). In the current business dynamics, there is a need for hospitality businesses to understand and optimize financial performance to drive innovation, remain competitive and attain sustainable growth. Financial performance entails assessing metrics such as net margin, growth prospects, return on assets, liquidity, and return on equity to understand the overall performance of hospitality and tourism facilities (Chrysafis et al., 2024). Additionally, the financial performance of hospitality facilities has been assessed using operational metrics like cost efficiency ratios, revenue per available room, occupancy rates and average daily rate (Panno, 2020). Although many authors have tried to classify and define metrics for measuring the financial performance of hotels and SMSEs (Kopecká, 2017; Mahmudova & Katonáné Kovács, 2021; Sampaio, Régio & Sebastião, 2024), none have thoroughly addressed the financial aspects of hospitality facilities in relation to application of green technologies. Since operational strategies directly affect a firm's financial performance, competitiveness has become a crucial concern in the travel and hospitality sector. Globally, hospitality facilities are increasingly implementing operational strategies to capitalize on opportunities and overcome obstacles created by new dynamics (Alonso et al., 2022). Saeidi et al. (2015) found that although a more competitive firm attracts more customers, it incurs more operational costs to maintain repeat business, which in turn affects its overall financial performance. Additionally, it has been established that the financial performance of Jordanian hotels is greatly impacted by the resources, capabilities, and strategic value of information (Jawabreh et al., 2022). Existing research majorly focus on implementing green-technologies in areas such as energy conservation and waste management to yield cost savings, increase operational efficiency and competitiveness, and ultimately higher financial outcomes (Galeazzo et al., 2021; Xie et al., 2019), suggesting that green-technology application improve business performance and market responsiveness. However, existing studies mostly focus on the craft and manufacturing sectors, and developed countries, with limited research on the financial performance of accredited hospitality facilities in developing countries like Kenya accrued from green-technology application. To address this gap, this study focuses on accredited hospitality facilities, examining the effect of green-technology application on financial performance, giving theoretical support and strategic guidance for hospitality facilities in their green-technology application.

Green-technologies are environmentally friendly technologies that are used to combat human-caused environmental damage and advance sustainable development (Shrivastava, 1995). In the last two decades, hospitality facilities have encountered difficulties due to increased operational costs, understaffing and inflation, pressures from competitive pricing and shift of consumer

expectations. This has resulted in promotion of sustainability initiatives. Applying waste reduction technology and energy management systems have been connected to considerable reductions in operational costs, hence increasing profitability (Mandal et al.,2024). Green technology has been shown to directly contribute to hotel cost reductions, hence improving hotel performance (Khalil et al., 2024). Energy-saving strategies like smart thermostats, predictive analytics, LED lighting, and controlled HVAC systems have been shown to minimize electricity use (Lee et al, 2024). Similarly, using water-saving strategies like low-flow fixtures, internet of things sensors, and automated irrigation systems has been shown to reduce water waste (Basu, 2024). This is crucial for hotels, which use more water per room per day than the local population (Suárez-Fernández et al., 2025). Furthermore, using green technologies helps to reduce waste generation and reduce disposal costs (Mandal et al., 2024). Operational savings from using green technologies may lead directly to enhanced profitability, making green technology a strategic investment in financial performance. Furthermore, green-technology application can differentiate a hotel from its competitors by providing a unique proposition that attracts guests, hence resulting in increased occupancy rates and higher average daily rates (Mazzucchelli & Chierici, 2024). It is against this background that the study proposes the following hypothesis:

H_0: There is no significant effect of green-technology application on the financial performance of accredited hospitality facilities in Kenya

Given the three-distinct green-technology application aspects in this study, it was necessary to disintegrate this hypothesis into three and restate it as shown:

H_0: There is no significant effect of energy-efficient appliances on the financial performance of accredited hospitality facilities in Kenya

H_0: There is no significant effect of water-efficient appliances on the financial performance of accredited hospitality facilities in Kenya

H_0: There is no significant effect of waste management appliances on the financial performance of accredited hospitality facilities in Kenya

Based on the preceding literature review, this study develops a theoretical framework, as indicated in Figure 1, to systematically uncover the effect pathways of green-technology application on the financial performance of accredited hospitality facilities. The framework identifies energy-efficient appliances, water-efficient appliances and waste management appliances as the core variables that have direct effect on financial performance of accredited hospitality facilities. The purpose of this framework was to give a vivid theoretical foundation and analytical direction for subsequent empirical research.

Independent Variable

Green-technology Application Performance

Dependent Variable

Financial

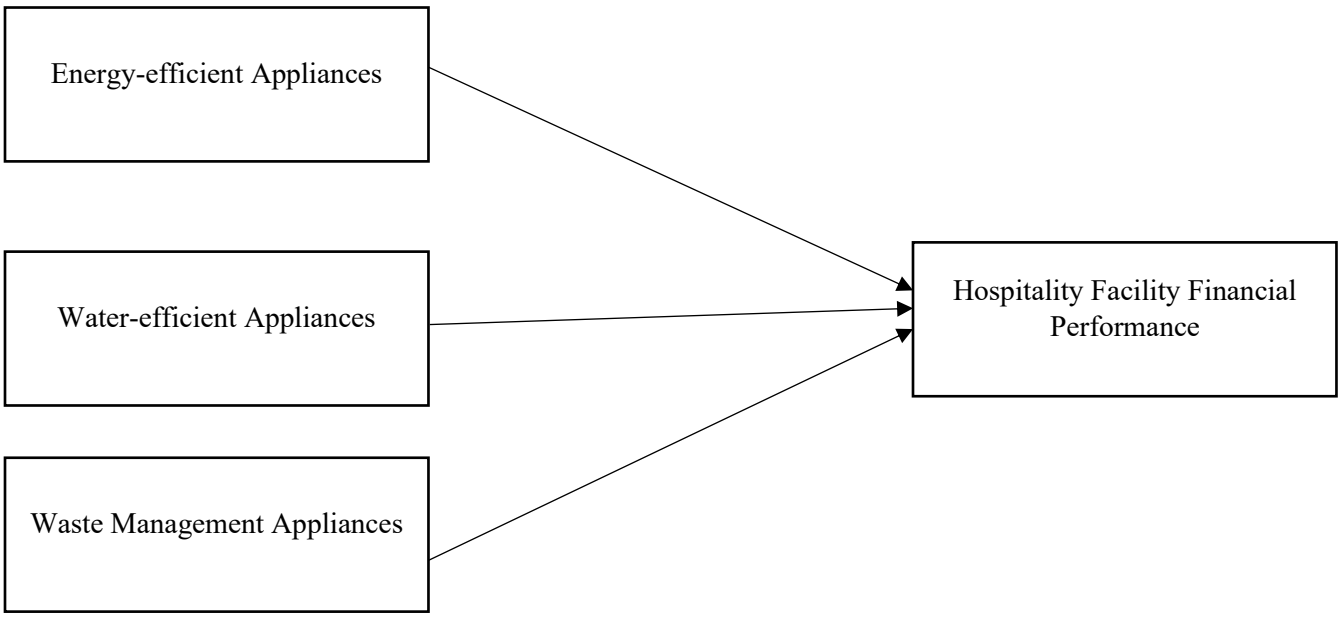

Figure 1 Theoretical Framework Diagram

Methodology

A quantitative research approach and descriptive cross-sectional design were used for data collection from facility managers of accredited hospitality facilities in Kenya. A descriptive cross-sectional design provided an opportunity to collect data at a single point in time, thus ensuring data and variable integrity and enabling analysis of relationships among the study variables. The study targeted 449 accredited hospitality facilities in Kenya. The survey was majorly distributed to hospitality facility managers. Structured questionnaires were utilized to gather data from the participants. The respondents were asked to fill the questionnaire with a 5-point Likert scale that measured the effect of green-technology application on financial performance of accredited hospitality facilities in Kenya. The Likert scale allowed quantification of responses across defined percentage ranges, allowed large scale data collection and promoted interpretive validity. A total of 216 questionnaires were distributed to the sampled accredited hospitality facilities in Kenya, with 208 responses collected, leading to a response rate of 96.29%. After excluding incomplete responses, 206 valid responses were achieved, resulting in 95.37% effective response rate. The sample included those hospitality facilities accredited by Kenya Tourism Regulatory Authority (2024).

Data analysis

The quantitative data analysis method was used to analyze the collected data. Prior to entering data values into SPSS 22, the responses of participants were reviewed for completeness and readability. Surveys were numbered as they were received. The frequencies of each item were calculated, and missing data and outlier responses were checked. Using the screened data, regression analysis was conducted to examine the effect of green-technology application on financial performance of accredited hospitality facilities in Kenya.

Results

Demographic characteristics

Distribution frequency was utilized to gain better understanding of the respondents and facility profiles. The results obtained are shown in Table 1 and Table 2.

Table 1 Facility Profile

Facility Profile	Frequency	Percent
Bronze rated	70	34.0
Silver rated	78	37.9
Gold rated	58	28.2
Total	206	100.0

Table 1 gives a summary of certification achieved for accredited hospitality facilities in which the survey was carried out. The table indicates that majority (37.9%) of the respondents were from silver rated facilities, followed by 34% from bronze rated hospitality facilities.

Table 2 Respondents' demographic characteristics

Respondents Characteristics		Frequency	Percent
Gender	Male	105	51.0
	Female	101	49.0
	Total	206	100.0
Education level	PHD	25	12.1
	Masters	38	18.4
	Bachelors	85	41.3
	Diploma	44	21.4
	Certificate	14	6.8
	Total	206	100.0
Years Managed the facility	Less than 5 years	38	18.4
	6-10 years	72	35.0
	11-20 years	63	30.6
	Above 20 years	33	16.0
	Total	206	100.0
Facility Competitiveness and green-technology application knowledge	Fair	43	20.9
	Good	92	44.7
	Excellent	71	34.5
	Total	206	100.0

Table 2 summarizes the demographic characteristics of the study participants, including gender, education level, number of years in hospitality facility management, and understanding of facility competitiveness and green-technology application. The results show that the sample was primarily made up of respondents with a bachelor's degree (41.3%), followed by those with a diploma (21.4%), with the majority of respondents (51%) being male. A higher percentage (35%) of the sample had managed a hospitality facility for six to ten years, followed by those who had managed a hospitality facility for eleven to twenty years (30.6%). Managing the hospitality facility for more than three years is considered adequate for respondents to provide relevant information for the study. The majority (44.7%) of the respondents had good knowledge of facility competitiveness and technology application. This implies that respondents were able to provide relevant information to the investigation as earlier anticipated.

The effect of green-technology application on the financial performance of accredited hospitality facilities

The study sought to examine the effect of green-technology application on the financial performance of accredited hospitality facilities in Kenya. The study used multiple regression analysis to examine the effect of green-technology application on the financial performance of accredited hospitality facilities. Given the three-distinct green-technology application dimensions in this study, it was necessary to disintegrate study hypothesis, "$H_{0:}$ There is no significant effect of green-technology application on the financial performance of accredited hospitality facilities in Kenya" into three as aforementioned. The results of multiple regression analysis are indicated in Table 3. From the multiple regression results, it can be observed that energy-efficient appliances (EEA), water-efficient appliances (WEA) and waste management appliances (WMA) have a direct and significant effect on financial performance (FINPA). The energy-efficient appliances had the strongest effect ($\beta = .354$, $t = 5.73$, $p < .001$) on financial performance of accredited hospitality facilities, followed by waste management appliances ($\beta = .315$, $t = 5.17$, $p < .001$) and water-efficient appliances ($\beta = .230$, $t = 3.81$, $p < .001$). This implies that enhancement in each of these sustainability initiatives are linked to increased financial performance. These green-technologies represent valuable, rare, inimitable and non-substitutable resources that can differentiate a facility and make an immense contribution to sustainable competitive advantage. Integrating these resources enables the hospitality facility to innovate and respond to environmental concerns that are becoming essential in current global sustainability trends. Investing in green-technologies can support both cost leadership and differentiation strategies; while energy and water appliances reduce operational costs, waste management appliances enhance visibility in sustainability efforts, hence attracting eco-friendly guests, improve brand reputation and customer loyalty.

Table 1 Multiple Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	.531	.200		2.660	.008	.137	.924
	WEA	.232	.061	.230	3.810	.000	.112	.352
	WMA	.307	.059	.315	5.171	.000	.190	.424
	EEA	.343	.060	.354	5.727	.000	.225	.461

a. Dependent Variable: FINPA

Table 4 model summary shows that integration of energy-efficient appliances, water-efficient appliances and waste management appliances predicts financial performance significantly with a strong overall fit. The model obtained an R^2 of .607, $F(3, 202) = 104.16$, $p < .001$, implying that approximately 60.7% of variance in financial performance is explained by the combined effect of energy-efficient appliances, water-efficient appliances and waste management appliances. This

confirms that including green technologies in hospitality facility management contributes meaningfully to financial performance of the facilities.

Table 2 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.779[a]	.607	.602	.49020	.607	104.161	3	202	.000

a. Predictors: (Constant), EEA, WEA, WMA

Discussion

As per the data of this study collected from 206 accredited hospitality facilities in Kenya, this study explores the effect of green-technology application on financial performance of accredited hospitality facilities. The results reveal that energy-efficient appliances, water-efficient appliances and waste management appliances dimensions of green-technology application significantly improve financial performance of accredited hospitality facilities. This quantification of the relative strategic value of each green technology advances existing knowledge and reinforces green technologies' role as strategic resources and sources of competitive advantage. Early research has broadly affirmed the financial benefits accrued from sustainability in hospitality, but in most often green technologies were considered as a collective construct. For instance, energy-efficient systems have been linked to operational costs reduction and improvement of profitability in water and wastewater utilities (Twi-Yeboah et al., 2024). Similarly, investing in conserving water and investing managing waste have been connected to reduction in environmental impact and enhanced resource efficiency (Limaye & Welsien, 2019). However, the present study differentiates itself by isolating the financial impact of each group; energy-efficient appliances, water-efficient appliances and waste management appliances. This uncovers a hierarchy of strategic significance. Additionally, unlike early research that majorly concentrated on craft and manufacturing sectors as well as developed countries, this present study targeted accredited hospitality facilities in Kenya, bridging gaps in existing literature by applying resource-based view theory and Porter's Competitive advantage theory to this group (Galeazzo et al., 2021; Xie et al., 2019).

Regarding practical implications, the present study gives vivid guidance for hospitality facilities' green-technology application. Hospitality facility managers ought to recognize the significant role of green-technology application in enhancing financial performance and consider it as a core strategic priority. Energy-efficient appliances have been revealed to provide the strongest positive effect on financial performance, hence hospitality facility managers ought to prioritize it as it would provide highest return on investment among three green practices. This corroborates with Saikia's (2024) findings that energy conservation improves operational efficiency and saves costs significantly in hospitality sector. Water-efficient appliances and waste management appliances

contributes positively to saving costs, though to a lesser extent, implying the need for a holistic sustainability strategy to improve financial performance. Green orientation and environmental strategies, particularly those that reduce wastes and conserve water improve both environmental and financial performance in restaurants (Khan et al., 2024). The present study findings indicate that green technologies are no longer ethical choices but financial prudent investments, as they are able to reduce utility costs, environmental impacts and improve brand reputation. This in turn attract eco-conscious investors and guests. Furthermore, Alvarez (2023) support the present study findings by indicating that sustainability practices enhance valuation and reduce exposure to ESG-related risks, enabling the businesses to become more attractive for accessibility of capital and acquisition. Therefore, hospitality facility managers ought to apply a tiered sustainability strategy, prioritize energy-efficiency for immediate financial performance while incorporating water-efficient appliances and waste management appliances for long-term resilience and stakeholder trust.

Although the present study findings provide insightful information regarding the effect of green-technology application on financial performance of accredited hospitality facilities, many limitations create a need to reflect and suggest future research directions. Firstly, the study depends on cross-sectional data, limiting its ability to infer causality between applying energy-efficient appliances, water-efficient appliances and waste management appliances and financial performance. Longitudinal studies could provide a better view of the temporal dynamics and sustainability of green-technology application impacts. Secondly, the model fails to consider contextual factors like firm size, regulatory environment and geographic location that may moderate green technologies' effectiveness. Lastly, failure to disintegrate the financial performance metric masks variations in cost savings, revenue growth or profitability. There is need to investigate multidimensional financial measures and integrate qualitative research to understand hospitality facility managers' motivations and barriers for green-technology application.

Limitations

The present study is limited to accredited hospitality facilities in Kenya, making the representation of hospitality facilities insufficient. This may reduce generalizability of the findings to regions with different economic conditions, regulations on environments and infrastructural development. Future research ought to extend the geographic scope to improve generalizability of the study findings. Also, present study relies on quantitative methodology, hence the need for future research to consider mixed-method to enhance the accuracy and strength of the conclusions.

Conclusion

This study, based on a sample of 206 accredited hospitality facilities in Kenya, investigated the effect of green-technology application on financial performance of accredited hospitality facilities. The findings affirmed that energy-efficient appliances, water-efficient appliances and waste management appliances dimensions of green-technology application enhanced financial

performance significantly. Energy-efficient appliances offer strongest significant effect on financial performance of accredited hospitality facilities, followed by waste management appliances and water-efficient appliances. This emphasizes the need to incorporate these green technologies in hospitality operations to reduce costs, improve revenue and profit margin. Generally, the results indicate that green technologies are strategic resources that minimize operational costs, strengthen competitiveness and enhance profitability, thus positioning sustainability as an essential factor of financial performance in the hospitality sector.

Recommendation

The present study findings offer many policy recommendations to improve financial performance and sustainability within hospitality sector. Firstly, since energy-efficient appliances indicated strongest positive effect on financial performance, industry regulators and government ought to prioritize incentivizing application of energy-efficient appliances via certification programs and tax rebates. Secondly, an introduction of mandatory sustainability standards that requires hospitality facilities to incorporate waste management appliances and water-efficient appliances. Lastly, public-private partnerships need to be created to support capacity-building and training initiatives to assist the managers understand the strategic benefits of applying green technologies. These policies would improve environmental protection and reinforce application of green technologies as levers of long-term financial performance and competitive advantage.

Limitations and Future research

Although the study presents strong statistical information, it has some limitations that need further research. The study is limited in its dependence on cross-sectional data, which limits the ability to infer causality between green-technology application and financial performance. Future research should examine the longitudinal effects of applying green technologies, especially energy-efficient appliances, water-efficient appliances, and waste management appliances on financial performance of hospitality facilities. Although the present model shows strong relationships, it fails to capture evolution of these impacts over time or under different economic conditions. The present study exclusively focuses on accredited hospitality facilities in Kenya, making it difficult to generalize the findings to regions with different regulatory, economic and infrastructural contexts. Future research ought to investigate moderating variables like environmental regulation, firm size and geographic location to clarify the effect of contextual factors on green- technology application's effectiveness. An inclusion of non-financial performance measures like brand equity, employee engagement and customer satisfaction would extend the scope in the future research and offer a more holistic perspective of strategic value of applying green technologies in hospitality sector.

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