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Circular Economy and Its Influence on Customer Satisfaction Among Star-Rated Hotels in Kenya: Water Management Perspective

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Abstract
Most economies in the world depend on the tourism industry as a significant contributor to their foreign exchange. Notwithstanding its positive contributions, the tourism industry has inherent challenges that cannot be ignored. Climate change and resource depletion are some of the challenges. It is estimated that tourism and hospitality contribute 8% of the GHG emissions globally. These challenges require the adoption of business models that support long-term sustainability. This research sought to assess the relationship between the adoption level of water management strategies and their influence on customer satisfaction among star-rated hotels in Kenya. The study targeted the 48-star-rated hotels. A sample size of 367 was obtained from a population of 8731 hotel customers from 48 star-rated hotels in Coast Region of Kenya using Israel's formulae of 1992. The study used a mixed-method research design. Stratified sampling was used to select the 2-to-5 star-rated hotels. Disproportionate sampling was employed to apportion questionnaires to hotels, while simple random sampling was employed to select customers. Data was collected through questionnaires, interview schedules, and an observation checklist. The data from questionnaires were coded into Statistical Package for Social Sciences (SPSS v.29). A multiple regression analysis established statistically predictive estimates of water management on customer satisfaction (B=1.154, t=8.308, p=.000<.05). This implies that water management initiatives positively impact customer satisfaction. The study recommends that, hotels should communicate their water management initiatives to the guests. The knowledge gained may make them appreciate the initiatives better, hence enhancing their satisfaction.
***Key Words*:** *Circular Economy; Customer Ssatisfaction; Water Management; Star-rated hotels*

1. Introduction

Tourism as a sector is considered a major economic pillar and the second biggest source of foreign exchange in Kenya. For instance, tourism contributed KES 1 trillion to Kenya's foreign exchange in 2023 (World Travel and Tourism Council (WTTC) (2024). The earnings from the tourism sector were estimated at over USD 1.57 in 2019 (WTTC, 2021) while the total employment from tourism in the same period stood at 9% of total employment in Kenya (Economic Survey, 2020). The global hotel industry was worth USD 1.5 trillion in 2023, showing a 5% increase over the previous year while tourism and its related sectors contributed USD 5.4 billion to the Kenyan gross domestic product (GDP) in 2021 (Cowling, 2024).

Notwithstanding the substantial local, regional and global economic contributions of tourism, the sector faces increasing scrutiny due to its environmental footprint as a result of the growing consumerism (Lasisi, Eluwole, Alola, Aldieri, Vinci & Alola, 2021; Bekun, Gyamfi, Bamidele & Udemba, 2022; Mbokazi, 2024). According to the World Resources Institute [WRI], (2021), population growth and consumerism are set to rise to approximately 42% with the rising demand for food putting more pressure on the available materials for production. High demand for material is a catalyst for over-exploitation of the resources which contribute to planetary crisis including climate

change, biodiversity loss and pollution. For instance, according to African Development Bank Group [AfDB], (2018), Kenya has seen a series of climate change impacts that have caused socioeconomic losses estimated between 3% and 5% of the annual GDP over the past decade particularly the Kenya's Coastal Region. Kenya's Coastal Region is home to 4,329,674 people covering an area of 79,686.1 km² (Economy Survey,2020). The major economic activities in the region include tourism at 45%, maritime at 15%, agricultural industry at 8%, fisheries at 6%, agriculture at 5%, forestry at 4%, and mining at 2% (UNEP-Nairobi Convention, 2019). The Kenya Green Economy Assessment Report by the United Nations Environment Programme (UNEP) in 2014 indicated that the GDP could be 12% higher by 2030 if Kenya pursues a green growth pathway as opposed to a business-as-usual scenario (UNEP, 2021).

There is a growing trend of customers expressing preference for hotels with environmental and social programs aimed at addressing the climate change vagaries (Hilton, 2019). Green travel trend is gaining momentum among TripAdvisor members, as 71% intend to make eco-friendlier choices in the coming year, while according to Booking.com in 2023, 76% of travelers indicated a higher likelihood of booking a hotel if it had a green certification (Llanso, 2024). Furthermore, the study revealed that 43% of travelers are willing to invest more in accommodations that prioritize sustainability. Sustainability is aimed at enhancing resource efficiency. In order to promote resource efficiency, the Green Economy Strategy and Implementation Plan (GESIP) of 2017 by the Kenyan government had proposed an integration of circular economy (CE) in various sectors of the economy both in manufacturing and service.

Circular economy is a business model that operates under the principle of sharing, repair, reuse, reform, and recycling aimed at always maintaining the utility value of products and materials (Sehnem, Pandolfi & Gomes, 2019; Koech & Munene, 2020). CE works on the "make-use-recycle" philosophy. According to the Netherlands Enterprise Agency [NEA], (2021), CE creates environmental, customer, and resource values for businesses revolving around waste, water, and energy management. Tourism is undoubtedly one of the sectors whose undertakings have negative impacts on water resources if not managed sustainably (Sinha, Driha, & Balsalobre-Lorente, 2020). According to the United Nations Tourism, the tourism industry accounts for approximately 1% of global water consumption, although in destinations with high hotel density this percentage can be considerably higher (Roibak.com, 2025). Water is one of the most strategic natural resources for the tourism industry, and, within it, hotels are regarded as one of the main consumers of water (Tirado, Nilsson, Deya-Tortella & Garcia, 2019; Mendoza, Ferrero, Slokar, Amores, Azzellino & Buttiglieri, 2023). On average, water accounts for 10% of a majority of hotels' utility bills (Mugure, 2021) where laundry accounts for about 16% of the overall water usage (Omune, Kambona, Wadongo, & Wekesa, 2021). Water management is catering for present water needs for all consumers without limiting further supply in the future in hotels (Kasim, Gursoy, Okumus & Wong, 2014). Hoteliers may need to diversify their products and implement environmental initiatives and green practices since customers are more sophisticated and concerned about environmental matters (Graci & Dodds, 2018). The level of integration of sustainable environmental practices influences customer satisfaction with hotel offerings.

A study by Pujar and Deshpande, (2017) revealed that 79% of customers would prefer a hotel adopting sustainable practices over a hotel that does not, 98% of the customers were ready to save water while 52% of were ready to reuse linens. Antonova et al. (2022) established that most customers are increasingly demanding actions linked to water saving in hotels. Wario (2020) established that hotels in Kenya did not have comprehensive policies and strategies on water conservation even though there was modest use of recycling, towel and linen reuse, and use of water-efficient equipment. Nthiga (2018) discovered hotels in Kenya had adopted limited use of water conservation strategies.
According to Gaffar, Rahayu, Wibowo and Tjahjono (2021), many hotel brands across the globe are implementing CE to either enhance visitors' experiences or to promote energy, waste, and water management or gain legitimacy in the operating environment. According to the Legitimacy Theory by Ashforth and Gibbs in 1990, sustainable social and environmental practices are usually aimed at gaining the backing of critical stakeholders, including customers, access to necessary resources, and gaining and maintaining legitimacy in the market. However, not all hotels implement CE practices with the same agility. According to Gaturu, Mutinda and Miricho (2022), 5-4star hotels have integrated water conservation strategies than lower category hotels in Kenya. Some studies have indicated that higher-category hotels consume more water annually than lower-category hotels (Rico-Amorós, Olcina-Cantos, Baños-Castiñeira, Garcia & Saurí, 2020). This is due to the fact that the higher the category of the hotel in terms of the star rating, the more water-consuming facilities the hotel has on site (Ozder, 2024). Other studies have noted that as hotel size increases, water consumption per accommodation night decreases (Mclennan et al., 2017; Gabarda-Mallorquí,

Fraguell & Ribas, 2018). However, Antonova *et al*. (2023) opined that there is no consensus about whether hotel size or chain affiliation dictates the level of water consumption exhibited by hotels.

McCartney (2018) asserted that circular water management techniques may increase water efficiency by re-optimising, reusing, and replenishing aquifers, ensuring that industrial systems are resilient to the effects of climate change, leading to increased financial gains for firms. Different star-rated hotels employ varied measures to manage their water consumption ranging from installation of flow restrictors on taps and showers in guest rooms and public areas, dual flush toilets, elimination of bidets, reuse of swimming pool water, recycling of waste water for irrigation purposes, and implementation of environmental certifications (Orynycz & Tucki, 2021; Ozder, 2024). Most of existing studies have focused on CE models in other industries (Florido, Jacob & Payeras, 2019; Rajic, Maksimovic & Milosavljevic, 2022), with few studies in the hospitality industry (Anton & Almeida, 2019; Mugure, 2021). Therefore, there are scanty empirical evidence that links water management and customer satisfaction especially among star-rated hotels in the Kenya's Coastal Region presenting contextual, empirical, knowledge and conceptual gaps. The study was therefore conducted to bridge the above research gaps.

The study was guide by the following objective:

1. To find out whether the adoption level of water management practices among star-rated hotels in Kenya impacts customer satisfaction.

Additionally, the study had the following hypothesis:

$H_0$1: The adoption level of water management practice among star-rated hotels in Kenya has no significant impact on customer satisfaction.

2. Research Methods

The study employed a convergent mixed-method research design. Data was collected at two levels. The first level, quantitative data, was collected from customers using questionnaires, while the second level, qualitative data, was collected from hotel staff using interviews. The study targeted all forty-eight (48) 2- to 5-star-rated hotels found within the Coastal Region of Kenya (Tourism Regulatory Authority Classification Register, 2020).

The sample size for the hotel customers was determined through Israel's formula since the total population of customers is finite. The sample size was determined at 5% precision and 95% confidence levels using the following formulae:

$n= \frac{N}{1+N(e)^2}$---------- Equation ------(i)

Where;

n= Sample size

N= Population size

e= Level of precision

$n= \frac{8731}{1+8731(0.05)^2}$=382.48….383

Applying the equation (i) for hotel customers yielded a significant sample proportion of the study population. Since the population of hotel customers in 2- to 5-star-rated hotels in the Coast Region is finite, the study employed the Rose, Spinks, and Canhoto (2015) sample adjustment formulae as shown:

Population correction factor with finite values;

$n_a= \frac{nr}{1+(nr-1)/N}$ -- ----------Equation--------(ii)

Where;

na= The adjusted sample size

nr= The original required sample size

N= Population size

$n_a= \frac{383}{1+(383-1)/8731}$ =366.93….367

Thus, based on equations (i) and (ii), the bare minimum sample size needed to carry out the research and yield sufficiently representative results was 367 respondents.

The study sampling frame consisted of the 4 strata ranging from 2–5-star hotels, each representing a hotel star-rate. One hotel was picked from each of the four strata for pre-testing. Therefore, the final sample frame consisted of 44 hotels. Stratified sampling was used to select the hotels. Disproportionate stratified sampling was used to apportion questionnaires to hotels under each stratum. This was done to avoid chances of under-representation emanating from

a high strata population ratio. Simple random sampling was used to select customers from each hotel for the questionnaires. The number of participants for the questionnaires for each stratum was determined as a ratio of the sample size based on the total number of classified hotels. Out of the determined customers' sample size of 367, and using hotels distribution per stratum, there were 42 participants from the 5 hotels rated 5 stars, 108 participants from the 13 hotels rated 4 stars, 108 participants from the 13 hotels rated 3 stars, and 108 participants from the 13 hotels rated 2 stars.

Table 1: Sampling Frame

Category	Hotel Sampling Frame		Customer Sampling Frame		Head of Maintenance Department Frame
	Total No. of Hotels	No. of Hotels Per Category Included	Sampled Customers per Stratum	Sampled Customers after Pre-Test Sample	Sampled Heads of Maintenance Departments or Equivalents
5-star Hotels	6	5	42	2	5
4-star Hotels	14	13	109	3	13
3-star Hotels	14	13	109	3	13
2-star Hotels	14	13	109	3	13
Sub-Total	**48**	**44**	**369**	**11**	**44**
Grand-Total					**413**

The researcher gathered primary data from first-hand sources through questionnaires, interviews, and personal observation. The three sets of multiple data instruments were used for the purpose of triangulation to improve the certainty of the data collected and validate the information gotten from each category of respondents. The questionnaires had closed-ended questions, which were evaluated on a Likert-type five-point scale. To measure the level of adoption of water management, the study used a scale of 1 to 5, where scale 1=Not at all, 2=Little extent, 3=Somewhat extent, 4=To a large extent and 5= To a great extent. For customer satisfaction, the study used a scale of 1-5, where 1=extremely unlikely (EU); 2=unlikely (U); 3=neutral (N); 4=likely (L); and 5=extremely likely (EL).

The interview exercise was guided by a pre-formatted schedule that contained 12 open-ended screening questions. This was done in order to get information from the heads of maintenance concerning the ways their hotels have adopted circular economy practices in their operations. The face-to-face interview provided a chance for the researcher to get better clarifications on the issues by customers during the survey. The interviews were analysed using content analysis The reliability of the research instrument was determined through Cronbach's Alpha using SPSS v.29 for water management constructs, and customer satisfaction using the cut-off criterion of 0.700. The reliability test revealed that water management practice had a reliability score of 0.841, while customer satisfaction, had a reliability score of 0.843. The overall Cronbach's alpha was 0.842. Mandan and Kesinger (2017) suggested a cut-off value of 0.70 to demonstrate that all the study constructs were reliable for data transformations and analysis.

A research authorisation letter was obtained from Pwani University Ethics Review Committee, Graduate School, which is certified by the National Commission for Science, Technology and Innovation (NACOSTI). In addition, a research permit was obtained from NACOSTI. The researcher personally conducted face-to-face oral interviews for the heads of maintenance departments and conducted personal observation in each hotel through booked appointments. Structured questionnaires were administered by the researcher or with the help of research assistants. Data collection of the questionnaires took approximately two months.

3. Analysis of Results

Out of the 367 questionnaires, 355 (96.7%) were collected, while 12 (3.3%) were not returned. Out of the 44 heads of maintenance departments targeted for interviews, only 43 (97.7%) interview schedules were filled. Out of the possible 44 hotels that were targeted for the personal observation survey, only 43 (97.7%) were reached. Table 2 outlines the summary of the respondents' demographics.

Table 2: Respondents' Demographics

Demographics	Indicators	Response Rate (%)
Gender	Male	165 (46.5%)
	Female	190 (53.5%)
	Prefer not to say	-
Age	18-24	44 (12.4%)
	25-34	106 (29.9%)
	35-44	128 (36.1%)
	45-54	55 (15.5%)
	55-64	22 (6.1%)
	65 or over	-
Level of Education	Certificate and below	33 (9.3%)
	Diploma	171 (48.2%)
	Degree and above	151 (42.5%)
Duration of Product Usage	3 years and below	238 (67%)
	4-8 years	117 (33%)
	9-13 years	-
	Over 14 years	-

The respondents were also requested to rate the extent of incorporation of the various indicators of water management practices and their influence on customer satisfaction. Table 2 indicates that the respondents reported assessments.

3.1. Influence of Water Management Practices on Customer Satisfaction

Table 3: Descriptive Statistics for Adoption Level of Water Management Practices by Star-Rated Hotels

Indicators	NA	L	S	TLEI	TGE	Mean (SD)
Reduction of the number of linen and towel changes for each customer	8.2	11	20.8	36.9	23.1	3.56(1.193)
Placing caution signage on water appliances to promote water conservation	3.4	6.8	23.4	42.8	23.7	3.77(0.997)
Installation of water-efficient taps, low-flow showerheads and other equipment	2.3	4.8	16.3	46.8	29.9	3.97(0.926)
Harvesting rainwater so as to cut on water charges	3.9	8.5	18.3	37.5	31.8	3.85(1.084)
Sensitizing customers on water management measures during check-in	1.1	2.8	12.1	43.1	40.8	3.73(1.176)
Aggregate						**3.78(1.075)**

Note. *n=355, NA=Not at All, L=Little, S-=Somewhat, TLE=To a Large Extent, TGE=To a Great Extent, SD = Standard Deviation*

The study findings in Table 3 presents the adoption level of water management practices by star-rated hotels. The reduction of linen and towel changes for each customer was adopted to a large extent by 36.9% of hotels, with 23.1% incorporating it to a great extent. This practice had a mean score of 3.56 and a standard deviation of 1.193 (M=3.56, SD=1.193), reflecting moderate incorporation with noticeable variability among star-rated hotels. Placing caution signage on water appliances to promote water conservation was implemented to a large extent by 42.8% of hotels, and 23.7% adopted it to a great extent, resulting in a mean score of 3.77 and a standard deviation of 0.997 (M=3.77, SD=0.997), indicating a relatively consistent adoption.

Furthermore, the installation of water-efficient taps, low-flow showerheads, and other equipment was incorporated to a large extent by 46.8% of hotels, with 29.9% implementing it to a great extent, yielding the highest mean score of

3.97 and a standard deviation of 0.926 (M=3.97, SD=0.926), showing a strong adoption level with minimal variation. Harvesting rainwater to reduce water charges was adopted to a large extent by 37.5% of hotels, and 31.8% adopted it to a great extent, with a mean score of 3.85 and a standard deviation of 1.084 (M=3.85, SD=1.084), indicating solid adoption. Finally, 43.1% of hotels incorporated sensitising customers on water management measures during check-in, with 40.8% adopting it to a great extent, with a mean score of 3.73 and a standard deviation of 1.176 (M=3.73, SD=1.176), reflecting strong but somewhat varied implementation among star-rated hotels.

The study results were validated by the findings from the content analysis of interviews and personal observations, which showed that 95.5% (42) of star-rated hotels had in place water conservation installations aimed at saving on water usage (water-efficient taps, low-flow showerheads), with 70.5% (31) utilising their recycled water for landscaping. For instance, from the interview of *SRH13*;
"Our hotel has water efficient taps with faucets, aerators and water sensors in strategic areas within the establishment"

Table 4: Descriptive Statistics on the Influence of CE Practices on Customer Satisfaction

Indicators	EU	U	N	L	EL	Mean (SD)
Recommend the hotel to others.	1.1	2.8	12.1	43.1	40.8	4.20(0.841)
Purchase the hotel services and products again in future.	0.6	3.9	5.9	46.5	43.1	4.28(0.790)
Spend more on the services and products available	1.7	3.1	22.8	41.7	30.7	3.97(0.901)
Increase the number nights of stay.	1.7	7	20.6	43.9	26.8	3.87(0.945)
Join the hotel loyalty program as a loyal customer.	1.1	4.2	14.1	48.5	32.1	4.06(0.855)
Rate the hotel highly on on-line marketing platforms (Airbnb, Trip Advisor etc).	1.1	2.8	8.7	39.4	47.9	4.30(0.831)
Aggregate						**4.11(0.861)**

Note. *n=355, EU=Extremely Unlikely, U=Unlikely, N=Neutral, L=Likely, EL=Extremely Likely, SD = Standard Deviation*

Table 4 on customer satisfaction with CE (water management practices) in hotels indicates high levels of customer approval, showing that 40.8% felt likely they would recommend the hotel to others and 43.1% of respondents felt extremely likely, resulting in a mean score of 4.20 with a standard deviation of 0.841 (M=4.20, SD=0.841), suggesting strong satisfaction. For the likelihood of purchasing hotel services and products again in the future, 46.5% were likely, and 43.1% were extremely likely, yielding a mean score of 4.28 and a standard deviation of 0.790 (M=4.28, SD=0.790), reflecting strong positive sentiment toward repeat business.

Moreover, when customers were asked if they would spend more on the services and products available, 41.7% of respondents were likely, and 30.7% were extremely likely, resulting in a mean score of 3.97 with a standard deviation of 0.901 (M=3.97, SD=0.901), indicating a moderately positive response with some variation. When considering the likelihood of increasing the number of nights stayed, 43.9% were likely and 26.8% were extremely likely, with a mean score of 3.87 and a standard deviation of 0.945 (M=3.87, SD=0.945), reflecting a moderate to strong inclination towards longer stays, though with some variability.

Furthermore, for those who were asked if they would join the hotel loyalty program, 48.5% were likely, and 32.1% were extremely likely, yielding a mean score of 4.06 and a standard deviation of 0.855 (M=4.06, SD=0.855), indicating a strong likelihood of customers becoming loyal members. Lastly, when asked if they would rate the hotel highly on online platforms such as Airbnb or TripAdvisor, 39.4% were likely, and 47.9% were extremely likely, resulting in the highest mean score of 4.30 with a standard deviation of 0.831 (M=4.30, SD=0.831), demonstrating the strongest level of satisfaction.

3.2 Correlational Matrix

Correlation analysis was done for each predictor variable to determine the direction and degree of correlation with the dependent variable. Table 5 below shows the study results of the Pearson Correlation test.

Table 5. Correlations Analysis

	Waste Management	Energy Management	Water Management	Customer Satisfaction
Waste Management	1	0.877	0.678	0.723
Energy Management	0.877	1	0.789	0.816
Water Management	0.678	0.789	1	0.787
Customer Satisfaction	0.723	0.816	0.787	1

**Water Management*

Results in Table 5 on the correlation matrix reveal a moderate positive correlation of 0.678 between waste management and water management which suggests that improvements in waste management are associated with better water management. There is a strong positive correlation of 0.787 between water management and customer satisfaction which indicate that hotels with effective water management practices tend to have more satisfied customers.

3.3 Diagnostic Tests

The data was subjected to various diagnostic tests before the analysis so as to enable subsequent analyses. The study tested assumptions of normality, multicollinearity, autocorrelation, and residual tests. The test for normality was conducted using Shapiro-Wilk and Kolmogorov-Smirnov statistics, autocorrelation was established by applying the Durbin-Watson statistic, and the test of multicollinearity was done using the variance inflation factor and tolerance level.

3.3.1 Normality Test

In a normality test, the data is considered regularly distributed if the p-value is greater than 0.05.

Table 6: Shapiro Wilk Tests for Normality

Variable	Obs	Statistic of Shapiro-Wilk	Prob>z
Customer Satisfaction	355	0.719	0.067
Waste Management	355	0.985	0.091
Energy Management	355	0.990	0.224
Water Management	355	0.971	0.209

**Water Management*

From Table 6 the p-value is than 0.05, suggesting that the data were normally distributed. The normality test of data ensures the validity and reliability of the regression results.

3.3.2 Test of Multicollinearity

Multicollinearity exists when there is a strong connection between independent variables. When there are strong correlations between independent variables, the effects on the dependent variable are exaggerated in the regression model. To ensure that multicollinearity did not bias regression estimates, the variance inflation factor (VIF) and tolerance tests were performed.

Table 7: Test for Multicollinearity

Variable	Collinearity Statistics	
	VIF	Tolerance (1/VIF)
Waste management	4.344	0.230
Energy management	6.206	0.161
Water management	2.652	0.377
Mean VIF	**4.401**	

**Water Management*

Table 7 results show that multicollinearity is absent; every variable had a value inflation factor (VIF) of less than 10 and a mean of 4.401, both of which were below 10. For water management, the collinearity statistics show a tolerance of 0.377 and a VIF of 2.652, indicating low multicollinearity, suggesting that water management is less correlated with the other predictor. Since there is no multicollinearity, it means that the regression analysis model and its results on customer satisfaction is reliable and not exaggerated.

3.3.3 Serial Autocorrelation

It gauges how a variable's present values compare to its previous values. The Durbin-Watson (DW) test was employed to calculate the study's autocorrelation. The DW test resulted to a 0.957 p-value in Table 8 which is higher compared to the critical value of 0.05, indicating an absence of autocorrelation hence no association exists between the error terms for different data.

3.4 Regression Analysis

Table 8: Regression Model Summary for the Relationship between Circular Economy Practices and Customer Satisfaction

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
0.849a	0.721	0.719	9.29287	0.957

The model fitness statistics indicates that the model performs well in explaining the variance in the dependent variable. The correlation coefficient (R) of 0.849 suggests a strong positive relationship between the independent and dependent variables, indicating that the model captures a significant portion of the data's variability. The R-squared (R^2) value of 0.721 shows that 72.1% of the variance in the dependent variable is explained by the independent variables, which is a strong fit. The adjusted R^2 of 0.719, which accounts for the number of predictors in the model, is very close to the R^2 value, further suggesting that the model is well-fitting and not overfitting.

3.5 Analysis of Variance (ANOVA)

ANOVA was used to determine whether there is a significant effect on customer satisfaction on the incorporation of selected circular economy practices. Table 4.15 gives a summary of ANOVA results.

Table 9: Analysis of Variance (ANOVA)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	78319.306	3	26106.435	302.307	.000[b]
Residual	30311.443	351	86.357		
Total	108630.749	354			

a Dependent Variable: Customer Satisfaction; b Predictors: (Constant), Waste Management, Energy Management, Water Management

Findings on the ANOVA results indicate that the regression model explains a significant amount of the variance in the dependent variable in Table 9. The Sum of Squares for Regression is 78319.306, reflecting the variation explained by the model, while the Sum of Squares for Residuals is 30311.443, representing the unexplained variation or error in the model. The Total Sum of Squares is 108630.749, representing the overall variation in the dependent variable. The model has 3 degrees of freedom for regression and 351 degrees for the residuals, leading to a total of 354 degrees of freedom. The Mean Square for Regression is 26106.435, which indicates the average variation explained by the model, and the Mean Square for Residual is 86.357, showing the average error in the model. The F-statistic of 302.307 suggests that the model is highly significant, and the p-value (Sig.) of 0.000 further confirms that the model is statistically significant, meaning the independent variables are collectively important in explaining the dependent variable.

3.6 Hypothesis Testing of Results

Table 10: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	β		
(Constant)	-10.551	1.192		-8.848	.000
Water Management	1.154	.139	.381	8.308	.000
R Squared=0.849					
Prob> chi2 =0.0000					

Note. n = 355. β = Beta. Std = Standard

***H₀1**: The adoption level of water management practice among star-rated hotels in Kenya has no significant impact on customer satisfaction.*

Based on the data in Table 10, the unstandardized coefficient for water management is 1.154, with a standard error of 0.139, resulting in a t-value of 8.308 and a p-value of 0.000, indicating a highly significant positive effect on the dependent variable. The Beta value of 0.381 suggests a moderate positive relationship with the dependent variable (B=1.154, t=8.308, p=0.000<0.05); the null hypothesis **$H_0$1** is rejected, and it is deduced that the adoption of water management has a positive significant effect on customer satisfaction among star-rated hotels in the Coast Region of Kenya. This implies that a rise in the adoption level of water management size by a single unit result in a significant increase in customer satisfaction by 1.154 units with other variables held constant.

4. Discussion

The respondents attested that the reduction of linen and towel changes for each customer was being adopted to a large extent with noticeable variability among star-rated hotels (M=3.56, SD=1.193). The content analysis of the interview that established that some hotels lack linen and towel change policy. For instance, SRHI2; *"The hotel does not have written linen and towel change policy"*. Further thematic analysis also reported that 65.1% of the hotels lack written policy on linen and towel change. The respondents confirmed that placing caution signage on water appliances to promote water conservation was being implemented to a large extent practice by star-rated hotels (M=3.77, SD=0.997).

Furthermore, the respondents affirmed that the installation of water-efficient taps, low-flow showerheads, and other equipment was being incorporated to a large extent by star-rated hotels, showing a strong adoption level with minimal variation (M=3.97, SD=0.926). The thematic analysis of the observation guide confirms the strong adoption where 95.5% of the star-hotels sampled have in place water-efficient taps, and low-flow showerheads. For instance, SRHI2*; "We have water efficient taps with aerators and faucets, and dual flash toilets*". In addition, the respondents reported that harvesting rainwater to reduce water charges was being adopted to a large extent by star-rated hotels (M=3.85, SD=1.084). Lastly, the respondents averred that customer sensitisation on water management measures during check-in was being incorporated to a large extent by star-rated hotels (M=3.73, SD=1.176), reflecting strong but somewhat varied implementation among star-rated hotels.

The practice of installation of water-efficient taps, low-flow showerheads, and other equipment registered the highest mean and lowest SD. The high mean and SD was confirmed by the content analysis of the interview schedule that indicate that 95.5% (42) of the hotels have water conservation installations within their establishments. This is supported by Antonova *et al*. (2022), who concluded that the most-used water-saving systems in the hotel sector were water consumption control devices in showers and taps, optimal discharge systems in bathrooms, and efficient washing machines. Additionally, Omune *et al*. (2022) and Nthiga (2018) agreed that the most practiced water conservation measures by hotels in Kenya include ensuring water taps were not unnecessarily opened when not in use, carrying out repair of water leakages, and modest use of practices of installation, maintenance, and substitution.

From the reviewed literature, past studies appear to concur with the outcomes of this study that sustainable water management has significant influence on hotel sustainability initiatives and, customer satisfaction (Sinha *et al*., 2020; Lamm, 2021; Omune *et al*., 2021; Antonova *et al*., 2022; Gaturu *et al*., 2022). However, there was limited data linking the various indicators of water management practices to customer satisfaction. Thus, the conclusions from these results

that indicators of water management practices influence customer satisfaction at different levels can be considered as a contribution of new knowledge to the hospitality industry.

The outcome of the study has pivotal implications for hotel management and policymakers in the hospitality and tourism industry. From the study results, the implementation of sustainable water management practices by star-rated hotels is very important in attaining customer satisfaction. It is, therefore, important for the hotel managers to formulate policies that foster sustainable water management practices by hotel establishments, train staff, and institute proper customer sensitization guidelines for guests during check-in and while in the facility. The Ministry of Tourism and Wildlife through TRA should develop and train hoteliers on water conservation practices in partnership with key players like Ecotourism Kenya. TRA, in partnership with the Kenya Revenue Authority (KRA), should provide adequate incentives, including subsidies and tax waivers or exemptions, to hotels to encourage the purchase of modern equipment and the integration of water-saving programs that promote sustainable water management.

On linking water management practices to customer satisfaction, the respondents indicated the adoption of water management by hotels influenced their likelihood to recommend the hotel to others (M=4.20, SD=0.841), suggesting strong satisfaction in addition to the likelihood of purchasing hotel services and products again in the future (M=4.28, SD=0.790), reflecting strong positive sentiment toward repeat business. Similarly, the likelihood of customers spending more on the services and products available (M=3.97, SD=0.901), indicating a moderately positive response with some variation, as well as the likelihood of increasing the number of nights stayed (M=3.87, SD=0.945), reflecting a moderate to strong inclination towards longer stays, though with some variability. Furthermore, the adoption of water management influenced customers' likelihood to join the hotel loyalty program (M=4.06, SD=0.855), indicating a strong likelihood of customers becoming loyal members besides the likelihood to rate the hotel highly on online platforms such as Airbnb or TripAdvisor (M=4.30, SD=0.831) registering the highest means and lowest SD.

These findings concur with conclusions drawn by other researchers such as Graci and Dodds (2018), who stated that green practices by hotels is a tool for competitive advantage since customers are becoming more sophisticated and environmental conscious. Additionally, a study by Gaturu *et al*. (2022) revealed that implementation of water conservation strategies by hotels positively affects guest satisfaction. Moreover, other researchers have made similar assertions that customer satisfaction is determined by many factors, including environmental and resource usage matters that hotel must take keen interest in to remain competitive in the 21st century (Blad & Ibrahim, 2020; Zibell, Beznea, Torress & Sikora, 2021; Sun, Jiang, Feng, Wang & Zhang, 2022; Falatouri, Brandtner, Nasseri & Darbanian 2024; Nazarian, Shabankareh, Ranjbaran, Sadeghilar & Atkinson, 2024).

From the findings, there is need for hotels to integrate water management practices and develop standard operating procedures to help with the implementation of such practices. Hotels need to train staff and communicate the various water management to create awareness (Vehmas, Raudaskoski, Heikkilä, Harlin & Mensonen, 2018). Clear communication to customers is an enabler towards customer green behaviour (Dissanayake & Weerasinghe, 2021), while absence of information on environmental matters affects customers' attitudes and habits (Zibell *et al*., 2021). There is a need for policy guidelines or standards that compel hotels to report on their water consumption based on bed capacity from TRA as the industry regulator. Hotels should be encouraged to report on their environemental, social and governance (ESG) initiatives. Customers and the general public should be sensitised on the importance of patronising environmentally conscious hotel establishments.

5. Conclusion

The study concluded that sustainable water management is an important circular economy practice on customer satisfaction among star-rated hotels in Kenya. From the study outcomes, water management practices significantly influence customer satisfaction and should be a priority for hotels that aim to remain competitive by attracting the growing market of eco-conscious customers. This is supported by arguments by most researchers from the reviewed literature, who asserted that CE provides a holistic approach to resource utilisation and system effectiveness and is able to alleviate environmental degradation problems (Rahman *et al*., 2015; Geissdoerfer *et al*., 2017; Batista *et al*., 2018; Tri & Panji, 2020; Mazur-Wierzbicka, 2021; Chomba *et al*., 2022), which significantly contribute towards hotel overall performance. From the findings, there is need for enhanced customer sensitization on water management

initiatives by hotels as posited by the Theory of Planned Behaviour. The theory states that a logical and reasoned decision is guided by the information available to the individuals.

5.1. Limitations

The generalization of the study findings is influenced by the following limitations. The study used mixed method approach particularly cross-sectional design making it difficult to infer causality. Secondly, the study was only carried out in the Coast Region of Kenya. Thirdly, the study outcomes may have been affected by self-reported data and social desirability bias from the respondents. Lastly, the use of single informant per hotel for interviews could provide one view of the subject matter under study making it difficult to infer the findings.

6. Recommendations

6.1 Recommendations for Policy and Practice

Water management has been discovered to be positive predictors of customer satisfaction among star-rated hotels in the Coast Region in Kenya, the study recommends that the Tourism Regulatory Authority (TRA), in collaboration with National Environment Management Authority (NEMA) and county governments, should organise periodic seminars and capacity-building sessions on efficient water management initiatives, and the role of technology in water management for hotel operators to reinforce sustainable water management initiatives.

Lastly, the cost of acquisition of the latest technology or equipment like dual flash toilet cisterns, water-efficient taps, aerators and low-flow showerheads may be not be financially viable for small hotels. The study therefore recommends that TRA should make available financial incentives to include duty waivers and exemptions on equipment that enhance sustainable water management.

6.2 Recommendations for Further Research

The study was conducted among star-rated hotels found in the Coastal Region of Kenya. A similar study can be conducted targeting star-rated hotels in other parts of Kenya away from the coast region or in other countries. This will aid generalizability of the study findings.

The study established that customer awareness has no moderation effect on the relationship between circular economy (water management) and customer satisfaction. Future research may examine the moderation effect of staff awareness and top management commitment on the relationship between circular economy practices and customer satisfaction.

Lastly, the study employed convergent mixed method design where quantative and qualitative were collected and analysed concurrently. Future research may use sequential mixed method to deepen understanding of the circular economy and customer satisfaction in the tourism sector.

7. References

African Development Bank Group (AfDB). (2018). *Africa Tourism Monitor the High 5s – Tourism as a Pathway to Industrialisation, Integration, Quality of Life, Agriculture, and Powering Up Africa*, *5.* July 1st.

Alonso-Almeida, M. M., Rocafort, A., & Borrajo, F. (2016). Shedding Light on Eco-Innovation in Tourism: A Critical Analysis. *Sustainability*, *8*(12), 1262.

Anton, J., & Almeida, M. (2019). The Circular Economy Strategy in Hospitality: A Multicase Approach. *Sustainability*, *11*.

Antonova, N., Ruiz-Rosa, I., & Mendoza-Jimenez, J. (2022). Water Resource Management in Hotels Using a Sustainable Balanced Scorecard. *Sustainability, 14.*

Antonova, N., Mendoza-Jiménez, J., & Ruiz-Rosa, I. (2023). Determinants of Water Consumption in Hotels: New Insights Obtained Through a Case Study. *Water, 15*(17), 3049.

Bekun, F.V., Gyamfi, B.A., Bamidele, R.O., & Udemba, E.N. (2022). Tourism-Induced Emission in Sub Saharan Africa: A Panel Study for Oil-Producing and Non-Oil-Producing Countries. *Environmental Science and Pollution Research, 29*, 41725-41741.

Blad, T., & Ibrahim, G. (2020). *Evaluating Circular Business Models Bridging the Gap Between Circular Business Models and Customer Perceived Value* (Master's Thesis). Uppsala Universitet.

Christofi, M., Vrontis, D., Shams, R., Belyaeva, Z., & Czinkota, M. R. (2022). Sustained competitive advantage for sustainable hospitality and tourism development: A stakeholder causal scope analysis. *Journal of Hospitality and Tourism Research, 46(5*), 823-825.

Cowling, N. (2024). Contribution of Travel and Tourism to Gross Domestic Product (GDP) in Kenya from 2019 to 2021. *Statista*.

Dissanayake, D. G. K., & Weerasinghe, D. (2021). Towards Circular Economy in Fashion: Review of Strategies, Barriers and Enablers. *Circular Economy and Sustainability*.

Economic Survey. (2020). Kenya National Bureau of Statistics. Retrieved from **https://www.knbs.or.ke/economic-survey-2020/**

Elshaer, I. A., Azazz, A. M., Semlali, Y., Mansour, M. A., Elziny, M. N., & Fayyad, S. (2024). The Nexus Between Green Transformational Leadership, Employee Behavior, and Organisational Support in the Hospitality Industry. *Administrative Sciences, 14*(6), 107.

Falatouri, T., Brandtner, P., Nasseri, M., & Darbanian, F. (2024). Service Quality Dimensions in Austrian Food Retailing–a Text Mining Approach for Physical Retail Stores. *International Review of Retail, Distribution and Consumer Research, 00*(00), 1–36.

Florido, C., Jacob, M., & Payeras, M. (2019). How to carry out the Transition towards a more Circular Tourist Activity in the Hotel Sector. The Role of Innovation. *Administrative Science, 9*, (47).

Fuentes, E., Arce, L., & Salom, J. (2018). A Review of Domestic Hot Water Consumption Profiles for Application in Systems and Buildings Energy Performance Analysis. *Renewable and Sustainable Energy Reviews, 81*(1), 1530-1547.

Gabarda-Mallorquí, A., Fraguell, R. M., & Ribas, A. (2018). Exploring Environmental Awareness and Behavior Among Guests at Hotels that Apply Water-Saving Measures. *Sustainability, 10*(5), 1305.

Gaffar, V., Rahayu, A., Wibowo, A., & Tjahjono, B. (2021). The Adoption of Circular Economy Principles in the Hotel Industry, *Journal of Business and Economic Review*, *6*(1), 92–97.

Gaturu, S., Mutinda,R., & Miricho, M. (2022). Cost Reduction Strategies and Guest Satisfaction among Hotels in the Coast Region of Kenya. *Journal of Hospitality and Tourism*, *2* (1), pp 16 - 32.

Graci P., & Dodds M. (2018), "Evaluation of water saving measures in hotels: A Spanish case study". *International Journal of Hospitality Management, 34*(2), 181 – 191.

Hilton (2019). Hilton Commits to Cutting Environmental Footprint in Half and Doubling Social Impact Investment. CSRWire. **https://www.csrwire.com/press_releases/**

Kasim, A., Gursoy, D., Okumus, F., & Wong, A. (2014). The Importance of Water Management in Hotels: A Framework for Sustainability through Innovation. *Journal of Sustainable Tourism*, *22*, 1090-1107.

Koech, K., & Munene, J. (2020). *Circular Economy in Kenya. in: Ghosh S. (eds) Circular Economy: Global Perspective*. Springer.

Lamm, D. (2021). An Exploration of Environmental Practices in the Hospitality Industry. Evidence from Hotels in Addis Ababa, Ethiopia. *Journal of Environmental Management and Tourism (JEMT)*, *12*(2), 357-370.

Lasisi, T.T., Eluwole, K.K., Alola, U.V., Aldieri, L., Vinci, C.P., & Alola A.A. (2021). Do Tourism Activities and Urbanization Drive Material Consumption in The OECD Countries? A Quantile Regression Approach. *Sustainability, 13* (14).

Llanso, L. (2024, March 20). *The Rise of Sustainability in Hospitality: the Pivotal Role of Energy Efficiency*. Spacewell Energy. **https://www.dexma.com/blog-en/the-rise-of-sustainability-in-hospitality-the-pivotal-role-of-energy-efficiency**

Mandan, C. R., & Kensinger, E. A. (2017). Test–Retest Reliability of Brain Morphology Estimates. *Brain Informatics*, 4, 107–121.

Mbokazi, M. (2024). Impact of Waste Management in the Hospitality and Catering Industry. *Waste Management, 1*(1), 32.

McCartney, S. (2018). The Beginning of the End of those Tiny Shampoo Bottles. *The Wall Street Journal.*

Mclennan, C. J., Becken, S., & Stinson, K. (2017). A Water-Use Model for the Tourism Industry in the Asia-Pacific Region: The Impact of Water-Saving Measures on Water Use. *Journal of Hospitality & Tourism Research, 41*(6), 746- 767.

Mechri, H.E., & Amara, S. (2021). Investigation and Analysis of Energy and Water Use of Hotel Buildings in Tunisia. *Energy and Buildings, 241*, 110930.

Mendoza, E., Ferrero, G., Slokar, Y. M., Amores, X., Azzellino, A., & Buttiglieri, G. (2023). Water Management Practices in Euro-Mediterranean Hotels and Resorts. *International Journal of Water Resources Development, 39*(3), 485- 506.

Mugure, N. (2021). *Enhancing Sustainable Business Practices in the Hotel Industry in Kenya: A Case Study of 5-Star Hotels*. Research Project MBA. United States International University-Africa. Nairobi.

Nazarian, A., Shabankareh, M., Ranjbaran, A., Sadeghilar, N., & Atkinson, P. (2024). Determinants of Intention to Revisit in Hospitality Industry: A Cross-Cultural Study Based on Globe Project. *Journal of International Consumer Marketing*, 36(1), 62–79.

Nthiga, R. (2018). Adoption of Water Conservation Practices in Hospitality Establishments in Nakuru, Kenya. *African Environmental Review Journal, 3*(1) 108-117.

Omune, B., Kambona, O., Wadongo, B., & Wekesa, A. (2021). Environmental Management Practices Implemented by the Hotel Sector in Kenya. *World Leisure Journal*, 1-11.

Orynycz, O., & Tucki, K. (2021). Total Productive Maintenance Approach to an Increase of The Energy Efficiency of a Hotel Facility and Mitigation of Water Consumption. *Energies, 14*(6), 1706.

Ozder, C.A. (2024). *Water Management in Hotels: Systems, Strategies and Policies* (1st Ed) Detay Anatolia Akademik Publishing Ltd. Şti.

Papallou, E., Katafygiotou, M., & Dimopoulos, T. (2024). Emerging Sustainability Trends in Tourist Facilities: A Comparative Assessment of Multiple Hotels and Resorts. *Sustainability, 16*(9), 3536.

Pujar, R.P., & Deshpande, S. (2017). A Study of Customer Awareness of Sustainability Initiatives taken at Star Category Hotels in Hinjewadi Area of Pune. *Indira Management Review, 11* (2).

Rajic, M.N., Maksimovic, R.M., & Milosavljevic, P. (2022). Energy Management Model for Sustainable Development in Hotels within WB6. *Sustainability*, *14*, 16787.

Rico-Amorós, A. M., Olcina-Cantos, J., Baños-Castiñeira, C. J., Garcia, X., & Saurí, D. (2020). Declining Water Consumption in the Hotel Industry of Mass Tourism Resorts: Contrasting evidence for Benidorm, Spain. *Current Issues in Tourism, 23*(6), 770-783.

Rodriguez-Sanchez, C., Sancho-Esper, F., Casado-Díaz, A. B., & Sellers-Rubio, R. (2020). Understanding In-Room Water Conservation Behavior: The Role of Personal Normative Motives and Hedonic Motives in a Mass Tourism Destination. *Journal of Destination Marketing & Management, 18*, 100496.

Roibak.Com (2025, April 10). *Water Management in the Hospitality Industry: Key To Sustainability and Competitiveness*. Retrieved from **https://en.roiback.com/rb-academy/water-management-in-the-hotel-industry-key-to-sustainability-and-competitiveness**

Sehnem, S., Pandolfi, A., & Gomes, C. (2019). Is Sustainability a Driver of the Circular Economy? *Social Responsibility Journal*, *16*(3), 329–347.

Sinha, A., Driha, O., & Balsalobre-Lorente, D. (2020). Tourism and Inequality in per Capita Water Availability: Is the Linkage Sustainable? *Environmental Science and Pollution Research, 27.*

Sun, S., Jiang, F., Feng, G., Wang, S., & Zhang, C. (2022). The impact of COVID-19 on Hotel Customer Satisfaction: Evidence from Beijing and Shanghai in China. *International Journal of Contemporary Hospitality Management, 34*(1), 382–406.

Tirado, D., Nilsson, W., Deya-Tortella, B., & Garcia, C. (2019). Implementation of Water-Saving Measures in Hotels in Mallorca. *Sustainability, 11*, 6880.

(UNEP) United Nations Environment Programme. (2021). *The Role of Business in Moving from Linear to Circular Economies*. UNEP, Nairobi.

Vehmas, K., Raudaskoski, A., Heikkilä, P., Harlin, A., & Mensonen, A. (2018). Consumer Attitudes and Communication in Circular Fashion. *Journal of Fashion Marketing and Management: An International Journal*, *22*(3), 286-300.

Wan, Y..P., Chan, S..J., Huang, H.W. (2017). Environmental Awareness, Initiatives and Performance in the Hotel Industry of Macau. *Tourism Review, 72*, 87–103.

Wario, G. (2020). Effects of Environmental Sustainability Practices on Growth of Hotels in Kenya (Masters' Thesis, University of Nairobi).

(WRI) World Resource Institute. (2021). Can we feed the World without destroying the Planet? *World Resources Report.*

(WTTC) World Travel and Tourism Council (2021). Travel and Tourism – Economic Impact 2021: Global Economic Impact and Trends 2021.

(WTTC) World Travel and Tourism Council (2024). *Travel & Tourism Economic Impact Research (EIR)*. **https://wttc.org/research/economic-impact**

Zibell, L., Beznea, A., Torress, P & Sikora, I. (2021). *Expanding The Knowledge Base Around the Role of Consumers in the Circular Economy: Promoting Circular Behaviour in Textiles and Electronics.* Report for the European Environment Agency.