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The Relationship Between Green Innovation Adoption and Sustainability Performance in Nairobi's Star-Rated Hotels

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Abstract

Green innovation adoption has become increasingly important in curbing the hotel sector's environmental impact and satisfying environmentally woke customers. The purpose of this study was to explore the effects of green innovation adoption on the sustainability performance of star-rated hotels in Nairobi City County. The current study applied a cross-sectional survey research design, a Complete enumeration method to collect data using questionnaires and observation checklists and was guided by the Resource-Based View Theory. This research incorporated descriptive statistics and multiple linear regression to predict the impact of green innovation adoption on sustainability performance as well as the moderating influence of environmental commitment on the relationship between green innovation adoption and sustainability performance. The study showed that green process innovation adoption, green organizational innovation adoption and green technology innovation adoption respectively had a significant positive regression coefficient on the sustainability performance of star-rated hotels in Nairobi County, Kenya while environmental commitment had no significant regression coefficient on the relationship between green innovation adoption and sustainability performance. The study concluded that most star-rated hotels had adopted green innovation that contributed to sustainability performance and contributed to the understanding of green innovation adoption in the hospitality industry, and its impact on sustainability performance by the policy makers and hotel managers. Therefore, hotels should invest in and adopt green innovation to ensure the achievement of sustainable performance.

Keywords: Green innovation adoption, sustainability performance, green process innovation adoption, green organisational innovation adoption, green technology innovation adoption.

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Introduction

The notion of green innovation practices emerged at the end of the 20th century due to the increasing public concern about the sustainability of economic development that was roused up by the growing awareness of environmental issues such as the accelerating depletion of natural resources and the deterioration of environmental quality (Fadhil, 2016). Green innovation has become an accepted construct as environmental concerns such as global warming are becoming worldwide issues as many companies are faced with the pressure of adopting green innovation (Kunapatarawong & Martínez-Ros, 2016; Li et al., 2020; Ahmed et al., 2022). Therefore, hotels adopt green innovation and green strategies such as efficient energy and water usage to promote sustainable tourism development (Songur et al., 2023). Hotel's future survival is based on sustainability which is an important responsibility for hotels in a global competitive market and mitigation of harmful effects on the environment (Tariq et al., 2019). Green innovation comprises different dimensions including green product innovation, green process innovation, green technology innovation, and green organizational innovation (Peng et al., 2021). Hotels have an undeniably important role in the promotion of green consumption and the creation of the link between green innovation adoption and sustainability performance (Han et al., 2020). However, despite this important link and the effects of green innovation adoption in the hospitality industry, limited research has been conducted on green innovation adoption and sustainability performance. Further, in Nairobi County, Kenya, few studies have explored the effects of green innovation adoption on sustainability performance in the hospitality industry. The purpose of this study was to explore the effects of green innovation adoption on the sustainability performance of star-rated hotels in Nairobi City County. The study contribution is manifold. Firstly, provides an understanding of the need for the adoption of green innovation that will in return increase hotel competitiveness and general performance. Further, the environment will be protected from degradation caused by paper, waste and emissions that have proven over time to lead to pollution and environmental deterioration. Secondly, the study suggests ways in which operational costs could be reduced, while revenue is enhanced. Hotels through the understanding and implementation recommendations made, will gain Eco-certificate recognition awards towards the promotion of sustainability that not only benefits the hotels, but the country will also get closer to attaining the sustainable development goals.

Literature review

Green innovation adoption is still far from being universally embraced by the hospitality industry enterprises and companies around the world due to the different perceptions of the idea in various countries (Gyuracz-Nemeth et al., 2016). Previous research has shown that the adoption of green process innovation has a positive impact on firms' competitive advantage and sustainability. Existing research records that the enhancement of firms' existing production process, curbing negative environmental impacts caused by the hotel sector and other industries, makes it necessary for organizations and industries to adopt and invest in it (Xie et al., 2019). Adoption of green organizational innovation through green recruitment by revealing

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intentions related to environmental sustainability in the job specifications and descriptions increases the attractiveness of prospective employees. Hence contributing to organisations building a reputation inspired by the thinking that they are responsive to the environment (Guerci et al., 2016). Most hotels are yet to adopt green technology innovations as hotel managers are not well educated on these technologies, making hotels lag behind. Therefore, the need to research the effect of green technology innovation adoption on sustainability performance. Several research showed that managers who are committed to environmental protection and are aware of environmental needs are more motivated to adopt and incorporate green innovation into their production activities and implement environmental creativity and innovation in services and products provided to the hotel guests and customers (see for example Sendawula et al., 2021). Sustainability performance as a new term in the hotel industry has been previously ignored and only limited studies have addressed it (Elzek et al., 2021). From the existing literature, limited research has been conducted on sustainability performance in the hotel industry thus creating a gap and hence, more research needs to be conducted. This study, therefore, aims to contribute to existing literature by researching the effects of green innovation adoption on sustainability performance in star-rated hotels in Nairobi County, Kenya.

Methods

This study was carried out in star-rated hotels in Nairobi County, Kenya. The respondents were 212 hotels' topmost managers from the star-rated hotels listed in the Tourism Regulatory Authority report (TRA). The study adopted a cross-sectional survey research design and was guided by the resource-based view theory. The complete enumeration method was used to collect data in the 53 star-rated hotels. Questionnaires and observation checklists were used to collect data for this study. All measures in the current study were drawn from previous research and aligned with the conceptual aspects of each construct. Questionnaires and observation checklists were used to collect data for the current study. An observation checklist was used to capture green innovation indicators that could be seen and identified such as solar panels, metering equipment, such as computer-controlled allocation to balance electricity usage, sewage emission monitoring and disposal system, automatic sensing, timing, and HVAC devices, wide areas for plant growth for a green environment in the lobby or outside/surrounding the hotel, metering equipment to track and manage areas where water usage is higher, energy-saving light bulbs, use of safe and recyclable reusable packaging/ shopping bags for souvenirs and take-out food without overly packaging, water-saving toilets, room cards (keys) and the thermostat reset to a predetermined temperature when the customer leaves, water sprinklers in the gardens, rubbish and recycling bins in common areas, green mission statements and QR codes that were in the hotels. The questionnaire which was the main data collection instrument and was used to collect data from the topmost hotel managers, was made up of six sections. Section A dealt with the demographic characteristics of the respondents, while sections B, C, D and E covered green process innovation adoption, green organisational innovation adoption, green technology innovation adoption and environmental commitment respectively. The scales of measurement for the four sections were adapted from the studies by Jaworski & Kohli 1993; Gonzalez-Benito & Gonzalez-Benito, 2006; Chen & Chang, 2013; Song & Yu, 2018; Aboelmaged & Hashem, 2019. Section F encompassed of sustainability performance and the measures were derived from the works of Bou-Llusar et al. (2010); Chiou et al. (2011); Wang et al. (2014); Adebambo (2015); Maletic et al. (2015); Tomšič et al. (2015); Zhu et al. (2017); Li et al. (2018); Asadi et al. (2020); Wang (2021). All the observed variables were measured with descriptive anchors on numeric five-point Likert-style rating scale where the lowest rating "1" signified strongly disagree while a rating of "5" indicated strongly agree by the respondent. The IBM Statistical Package for Social Sciences (SPSS) version 25 was used to capture and analyse the data. The researcher tested the reliability of the research instrument using Cronbach's alpha. Further, descriptive statistics using means and standard deviation of green innovation adoption, green process innovation adoption, green organisational innovation adoption, green technology innovation adoption and environmental commitment to determine whether hotels had adopted green innovation adoption were conducted. In addition, the researcher also conducted the normality test, linearity test, multicollinearity test and direct and indirect effect regression model testing of each of the objectives using Multiple linear regression.

Results and discussion

Reliability analysis for the research instrument

The findings from Table 1, showed that the reliability score of the items used to measure the independent variables, green process innovation adoption, green organisational innovation adoption, and green technology innovation adoption was, 0.77, 0.81 and 0.82.

Table 1: Questionnaires reliability

Reliability Statistics	No. of items(n)	Cronbach's alpha	Comments
Green process innovation adoption	7	0.77	Reliable
Green organizational innovation adoption	7	0.81	Reliable
Green technology innovation adoption	7	0.82	Reliable
Environmental commitment	2	0.48	Moderately Reliable
Sustainability performance	14	0.92	Reliable

The reliability test for the dependent variable, sustainability performance was 0.92. This reliability test showed that indicators used in the measurement of the variables were very reliable because they met the threshold of 0.70 apart from environmental commitment, which recorded an alpha of 0. 48 as pointed out from Table 1. This is because only two items were used to measure and test the reliability. This showed that the research instrument used was suitable for this research in agreement with

Kubai (2019) who conducted research on reliability and validity of research instruments and document that a research instrument Cronbach's alpha coefficient is reliable when its reliability is >0.7, moderately reliable when its >0.5 and not reliable when its <0.5.

Mean scores

Table 2 shows means and standard deviations of the study variables. Most of the variables had very high means suggesting that they were highly rated by the respondents. All variables had small standard deviations indicating that more of the data were clustered about the mean.

Table 2: Means score of study variables

Items	N	Minimum	Maximum	Mean	S. D
Green Process Innovation adoption	174	1.00	5.00	3.52	1.40
Green Organizational Innovation adoption	174	1.00	5.00	3.59	1.34
Green Technology Innovation adoption	174	1.00	5.00	3.74	1.39
Environmental Commitment	174	1.00	5.00	3.66	1.40
Sustainability Performance	174	1.00	5.00	3.69	1.43

Direct Effects: Effect of green innovation adoption on sustainability performance of star- rated hotels in Nairobi County, Kenya

From table 3, the R-square value showed that 81 % of the total variations in sustainability performance of the star-rated hotels were attributed to green innovation adoption indicators (green process innovation adoption, green organizational innovation adoption, green technology innovation adoption). The prediction as shown on Table 3 reported to be significant as the results were; goodness fitness with F ratio of 234.70, with p-value of less than 0.05. This implied that the model correctly fitted data description and could be used to test the effects of green innovation adoption on sustainability performance of star-rated hotels.

Table 3: Model summary of the effects of green innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya

R	R^2	Adjusted R^2	Std. Error	F Change	Sig.
0.90	0.81	0.80	0.39	234.70	0.00
a. Dependent variable: Sustainability Performance					
b. Predictors: (constant), Technology, Process, Organizational					

From the findings of the model summary, the following hypotheses were tested:

> $H_0$1: There is no significant effect of green process innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya.
> $H_0$2: There is no significant effect of green organizational innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya.
> $H_0$3: There is no significant effect of green technology innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya.

From Table 4, the regression coefficient for green process innovation adoption was observed to be (β= 0.12, p<0.05, t=1.83) at a constant of 0.21 and a standard error of 0.06. The regression coefficient showed that a single unit change in green process innovation adoption, resulted in a 12% change in the sustainability performance of star-rated hotels in Nairobi County. The findings showed that there was a statistically significant positive coefficient which meant that the green process innovation adoption and sustainability performance tend to move in the same direction therefore, there is a statistically significant positive effect of green process innovation adoption on sustainability performance. Therefore, the null hypothesis $H_0$1 is rejected.

> $H_0$1: There is no significant effect of green process innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya.

Table 4: Regression coefficients for direct relationship model

		B	Std. Error	Beta	t	Sig.
	(Constant)	0.21	0.14		1.57	0.12
	Green Process Innovation adoption	0.12	0.06	0.11	1.83	0.04
	Green Organizational Innovation adoption	0.38	0.07	0.38	5.51	0.00
	Green Technology Innovation adoption	0.46	0.06	0.46	7.29	0.00

The second objective effect of green organizational innovation adoption and sustainability performance of star-rated hotels in Nairobi County. From Table 4, the regression coefficient for green organizational innovation adoption was (β=0.38, p<0.05, t=5.51) at a constant of 0.21 and a standard error of 0.07. These findings revealed that for a single unit change in green organizational innovation adoption, there is a 38% change in the sustainability performance of star-rated hotels in Nairobi County. The positive coefficient implied that the predictor variable which was green organizational innovation adoption had a statistically significant positive impact on sustainability performance at star-rated hotels. This meant that sustainability performance corresponds to change in green organizational innovation adoption in star-rated hotels. This indicated that the

green organizational innovation adoption has a statistically significant effect on sustainability performance of star-rated hotels. Therefore, the null hypothesis $H_0$2 is rejected.

> $H_0$2: There is no significant effect of green organizational innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya.

The third objective effect of green technology innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya. From Table 4, the regression coefficient for green technology innovation adoption was (β=0.46, $p<0.05$, t=7.29) at a constant of 0.21 and a standard error of 0.06. The positive coefficient for green technology innovation adoption showed that the predictor variable had a positive significant effect on sustainability performance of star-rated hotels. This meant that sustainability performance corresponds to change in green technology innovation adoption in star-rated hotels. Therefore, green technology innovation adoption has a significant positive effect on sustainability performance. Therefore, the null hypothesis $H_0$3 is rejected and as star-rated hotels adopt green technology innovation, sustainability performances of star-rated hotels are likely to significantly positively change.

> $H_0$3: There is no significant effect of green technology innovation adoption on sustainability performance of star-rated hotels in Nairobi County, Kenya.

Moderating effect of environmental commitment on the relationship between green innovation adoption and sustainability performance of star-rated hotels in Nairobi County, Kenya. The findings from Table 5 shows that the moderating factor had a beta value of 0.00 and the P-value of the moderating factor was greater than 0.05 which is the significance level. This observation meant that the moderating factor had no significant moderating influence on the relationship between green innovation adoption and sustainability performance since the p -values was greater than 0.05. Therefore, the null hypothesis $H_0$4 is accepted.

> $H_0$4: There is no significant moderating influence of environmental commitment on the relationship between green innovation adoption and sustainability performance of star-rated hotels in Nairobi County, Kenya.

Table 5: Regression coefficients for indirect relationship model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	0.26	0.37		0.70	0.48
	Green Innovation Adoption	0.77	0.13	0.72	6.18	0.00
	Environmental Commitment	0.16	0.11	0.20	1.46	0.15
	Moderating factor	0.00	0.03	0.02	0.10	0.92

Implications

The first objective sought to determine the effect of green process innovation adoption on the sustainability performance of star-rated hotels in Nairobi County, Kenya. The findings showed that there was a significant positive coefficient which meant that the variables tend to move in the same direction therefore, green process innovation adoption has an effect on the sustainability performance of star-rated hotels. These findings were in agreement with Wang et al. (2021) who found out that green process innovation directly and effectively improves the sustainability performance of enterprises and successfully helps improve green product quality and enhance market share. The results also aligned with Seman et al. (2019) who found that adoption of green process innovation has an effect on sustainable performance. The findings aligned with Joseph et al. (2023) whose findings stated that green process innovation had a significant positive relationship with the sustainability performance of hotels. The second objective intended to assess the effect of green organizational innovation adoption on the sustainability performance of star-rated hotels in Nairobi County, Kenya. From the significance of the values obtained, the results show that sustainability performance corresponds to a change in green organizational innovation adoption of star-rated hotels. The research results were in line with Iran et al. (2021) who found out that green organization innovation adoption and implementation enhances sustainability performance. Further, the findings aligned with Seman et al. (2019) results which indicated that green organization innovation adoption is highly linked to sustainability performance. The findings were also in agreement with Xuecheng et al. (2019) whose results indicated that green organization innovation adoption impacts and affects sustainability performance. The third objective aimed at knowing whether green technology innovation adoption had an effect on sustainability performance of star-rated hotels in Nairobi County, Kenya. From the significance of the values obtained, these findings implied that green technology innovation adoption has a significant effect on the sustainability performance of star-rated hotels. That is, as star-rated hotels adopt green technology innovation, sustainability performances of star-rated hotels are likely to significantly positively change. The results were in alignment with Wang et al. (2021) whose findings indicated that green technology innovation adoption positively correlates with and significantly improves sustainability performance. The findings also aligned with Shahzad et al. (2020) results that revealed green technology innovation adoption adequately contributes to the attainment of sustainability performance and also, important factors in the current knowledge-based economy. Concerning the influence environmental commitment has on the relationship between green innovation adoption and sustainability performance of star-rated hotels in Nairobi County, Kenya. The findings showed that the moderating factor had

no significant influence on the relationship between green innovation adoption and sustainability performance. The results were in contrast with Elzek et al. (2021) whose findings showed that environmental commitment contributes to increasing the impact of green innovation adoption on sustainable performance, which confirms the moderate role of environmental commitment. However, the findings were in agreement with Joseph et al. (2023) results that environmental commitment does not moderate the effect of green innovation adoption on sustainable performance and does not moderate the effect of green innovation processes on sustainable performance.

Conclusions and recommendations

The general purpose of this study was to determine the effects of green innovation adoption on the sustainability performance of star-rated hotels in Nairobi County, Kenya. For this reason, the study investigated the effect of green process innovation adoptions, green organisational innovation adoption and green technology innovation adoption on the sustainability performance of star-rated hotels in Nairobi County by collecting data from four topmost managers in the star-rated hotels by testing the research hypotheses. Further, the moderating effect of environmental commitment on the influence of the relationship between green innovation adoption and sustainability performance was determined. The findings of this study are drawn from the four objectives mentioned above which were subjected to statistical analysis and the research hypothesis were tested. The results of this research showed that green process innovation had been adopted by the majority of star-rated hotels in Nairobi County to enhance the attainment of sustainability performance. Further, the findings revealed that green process innovation adoption has a significant effect on sustainability performance in a positive way after multiple linear regression analysis had been conducted. The second conclusion related to green organisational innovation adoption and sustainability performance. The findings revealed that green organisational innovation adoption has a significant effect on sustainability performance in star-rated hotels in Nairobi County. From the analysis, the star-rated hotels that have adopted green organisational innovation to enhance sustainability agreed to adopt it so as to enhance sustainability in their performance. After regression analysis had been conducted, the conclusion was clear that there existed a significantly positive coefficient between green organisational innovation adoption and sustainability performance. Hence, the sustainability performance of star-rated hotels in Nairobi County is inclined to adopt green organisational innovation adoption. Further, the findings indicated the adoption of green technology innovations such as Solar panels, Metering equipment, such as computer-controlled allocation to balance electricity usage, Sewage emission monitoring and disposal systems, automatic sensing, timing, and HVAC devices. Metering equipment to track and manage areas where water usage is higher, Energy-saving light bulbs, Water-saving toilets, Room cards (keys) and the thermostat reset to a predetermined temperature when the customer leaves, Water sprinklers in the gardens and QR codes facilitated the star-rated hotels to achievement of sustainability in their performance. Based on the results there existed a significant positive effect of green technology innovation adoption on the sustainability performance of the star-rated hotels in Nairobi County. This was confirmed by the statistically significant positive regression coefficient between green technology innovation adoption and sustainability performance. The fourth conclusion was that the results of this analysis showed that environmental commitment as a moderating influence has no significant influence on the relationship between green innovation adoption and sustainability performance. The coefficient results and the p-value and t-statistics column demonstrated that there is no significant influence of environmental commitment on the relationship between green innovation adoption and sustainability performance of star-rated hotels in Nairobi County, Kenya. Finally, it was concluded that green innovation adoption dimensions (green process innovation adoption, green organisational innovation adoption, green technology innovation adoption) have a significant positive effect on Sustainability Performance and affect the sustainability performance of star-rated hotels in Nairobi County. Therefore, hotel managers and chief sustainability officers in the hospitality industry need to have an understanding of these factors that affect sustainability performance in order to remain operational and contribute to the achievement of SDGs in the country. Further, they need to also look at other indicators besides the ones addressed in this research and incorporate them into their operations so as to ensure that they are relevant in the dynamic world of hospitality and tourism as well as business.

The following recommendations were made based on the results obtained from subjecting the data collected to analysis and the above conclusions. Firstly, hotels should invest and adopt green process innovation in their organisation despite the costs it might incur in order to ensure they gain sustainability in their performance and be in operation long-term. Further, hotels should implement and adopt green organisational innovation in their operations to promote a greener environment and social and financial performance. In Addition, hotels should adopt green technology innovation in their organisations in order to enhance sustainability performance and be up to speed with the change in technology and advancement. Also, hotels should be intentional in adopting green innovation and view it as a success to attain sustainability performance. Further, hotel managers should be committed to taking care of the environment in and within their surroundings to achieve sustainable performance. Lastly, policymakers should implement laws such as fines or closure against hotels that are not environmentally friendly in all their operations, that is production, service and waste management.

Based on the research gaps identified the following areas for future research were suggested: The study was conducted in Nairobi County which has different star-rated hotels that were able to adopt green innovation. From them, the relationship between green innovation adoption and sustainability performance is understood. This, therefore, calls for the same study to be conducted in a different county or even two different countries with different measurement items on the data collecting tools to confirm the findings. Further, the study aimed at understanding the effect of green innovation adoption (green process innovation adoption, green organizational innovation adoption, green technology innovation adoption) on sustainability performance (environment, social and financial performance) and therefore, future studies could consider researching risks of

lack of green innovation adoption on the performance of hotels and hospitality industry. Additionally, the current study collected data from the four topmost managers in star-rated hotels, hence, this calls for further research on the same topic; however, the researcher should aim at collecting data from other staff in the hotel.

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