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DIGITAL INNOVATION STRATEGIES AND PERFORMANCE OF FIVE STAR HOTELS IN NAIROBI CITY COUNTY, KENYA

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Abstract: Despite the rapid expansion of Nairobi's hospitality sector, five-star hotels continue to experience inconsistent performance due to the slow adoption of digital innovation strategies. Many establishments still depend on traditional management systems that constrain competitiveness and profitability in an era where technology determines customer engagement and operational efficiency. The COVID-19 pandemic further exposed digital deficiencies within Kenya's hospitality industry, including inadequate online reservation systems, limited digital customer engagement, and weak data-driven marketing capabilities. Although global research underscores the role of technological innovation in enhancing hotel performance, few empirical studies have examined how specific digital strategies influence the performance of five-star hotels in Kenya. This study examined the effect of digital innovation strategies specifically E-commerce, the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data on the performance of five-star hotels in Nairobi City County. It was guided by the Innovation Management Theory, Diffusion of Innovation Theory, and the Theory on Measures of Performance. A descriptive research design was adopted, targeting 48 managers from ten five-star hotels selected through random sampling. Data were collected using structured electronic questionnaires and analyzed using descriptive statistics and multiple regression analysis in IBM SPSS. The findings revealed that digital innovation strategies collectively explained 66.2% of the variance in hotel performance ($R^2 = 0.662$, $F = 16.631$, $p < 0.001$). Big Data emerged as the strongest predictor ($\beta = 0.763$, $p < 0.001$),

while E-commerce showed a significant negative relationship ($\beta = -0.261$, $p = 0.024$). IoT and AI demonstrated positive but non-significant effects due to multicollinearity. The study concludes that digital innovation particularly Big Data analytics significantly enhances hotel performance through improved decision-making, guest personalization, and operational efficiency. It recommends strategic investments in data analytics infrastructure, enhanced e-commerce systems, IoT and AI integration, and continuous staff training to sustain competitiveness.

Keywords: *Digital innovation strategies, E-commerce, Internet of Things, Artificial Intelligence, Big Data analytics, hotel performance, five-star hotels*

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1.0 INTRODUCTION

A. Background of the Study

In recent years, the hospitality industry has undergone significant transformation driven by technological advancements that have reshaped how hotels operate and deliver services (Oracle Hospitality, 2016). Mobile devices and digital platforms have become essential tools for enhancing guest experiences and streamlining operations. However, compared to other sectors, the hospitality industry remains less digitally advanced, highlighting the need for further innovation. Digital transformation involves more than simply adopting technology; it requires creating real value for customers, improving operational efficiency, and achieving sustainable business outcomes (Bain & Company, 2018). Modern consumers increasingly expect personalized, technology-enabled experiences during their hotel stays. To meet these expectations, hotels are adopting innovative solutions such as mobile applications and web-based platforms that facilitate seamless communication between guests and hotel staff (Richard, 2017). These technologies enhance service quality and customer satisfaction while providing hotel managers with valuable data for improving operations. Nonetheless, implementing such systems requires considerable investment, technical expertise, and strategic planning to ensure effectiveness.

The COVID-19 pandemic emphasized the critical need for digital innovation and crisis resilience in the hospitality sector. Hotel occupancy rates declined sharply across major markets, revealing operational vulnerabilities and the need for improved health and safety practices (Jiang & Wen, 2020; Nicola et al., 2020). Scholars have highlighted the importance of strengthening organizational resilience and risk management strategies to help hotels withstand crises (Ramkissoon, 2020; Majeed & Ramkissoon, 2020). Globally, tourism continues to play a vital role in economic development. Despite previous challenges such as the SARS and H1N1 outbreaks, Africa's tourism industry demonstrated strong recovery, recording a 5.6% growth rate in 2018 surpassing the global average (World Travel and Tourism Council [WTTC], 2020). In Kenya, tourism remains a key economic pillar, generating approximately US\$1.57 billion in foreign exchange and supporting about 1.1 million jobs (WTTC, 2020). Visitor spending on

accommodation, dining, and entertainment significantly contributes to local and national economies (Deegan, 2020).

In recent years, Nairobi's hospitality sector has expanded rapidly, leading to increased competition among hotels and restaurants. To remain competitive, hotels have embraced digital tools such as online booking systems, Internet of Things (IoT) technologies, and artificial intelligence (AI) solutions to enhance guest services and operational efficiency (Kansakar et al., 2017; Gladston, 2016). However, adoption remains uneven, with large hotels benefiting from greater resources, while small and medium-sized enterprises (SMEs) face financial and technical challenges (Organisation for Economic Co-operation and Development [OECD], 2017b).

Performance of Five-Star Hotels

Service quality is a critical determinant of hotel performance and customer loyalty (Choi & Chu, 2001; Ramanathan & Ramanathan, 2011). High service standards foster customer satisfaction, enhance reputation, and create sustainable competitive advantages (Zhang et al., 2011). However, defining and measuring service quality remains complex due to cultural and operational differences (Salazar et al., 2010). Inconsistent service delivery, limited distribution channels, and fluctuating demand also hinder performance assessment (Sohrabi et al., 2012). The growing use of online reviews has further reshaped performance evaluation, as digital feedback now influences booking decisions and brand image (Li, Ye, & Law, 2012; Filieri & McLeay, 2013). As customer perceptions increasingly depend on online interactions, hotels must adopt effective digital and marketing strategies to sustain profitability (Kotler, 2016). Therefore, this study examines how service quality and digital marketing approaches affect the financial and operational performance of five-star hotels in Nairobi, Kenya.

Five-Star Hotels in Nairobi City County, Kenya

Nairobi's five-star hotels face numerous challenges, including labor shortages, evolving customer expectations, and the pressure to adopt digital innovations (Ministry of Tourism and Wildlife, 2020). The COVID-19 pandemic intensified these issues, highlighting weaknesses in technology integration and service delivery (Central Bank of Kenya, 2020). To remain competitive, hotels must exceed customer expectations through efficient digital strategies that enhance guest experiences and operational efficiency. The rapid growth of online travel agencies (OTAs) and shifting consumer behaviors demand personalized, seamless digital interactions. Yet, limited investment in technologies such as artificial intelligence (AI), e-commerce, and big data analytics continues to hinder performance (Bloch, 2011). Hotel chains are increasingly strengthening digital capabilities and customer relationship systems to improve personalization and responsiveness (Collins et al., 2015). Despite these efforts, there remains a research gap on how digital innovation strategies influence the performance of Nairobi's five-star hotels—an area this study seeks to address.

B. Statement of the Problem

The hospitality industry in Nairobi City County has experienced rapid growth, driven by increased domestic and international tourism. However, despite the expansion of five-star hotels, their performance has been inconsistent due to slow adoption of digital innovation strategies. In an era where technology defines customer engagement and operational efficiency, many hotels continue to rely on traditional management systems that limit competitiveness and profitability (Kansakar et al., 2017). Digital innovations such as artificial intelligence (AI), the Internet of Things (IoT), and big data analytics have revolutionized global hotel operations by enhancing service delivery, reducing costs, and improving decision-making (Buhalis & Leung, 2018). Yet, evidence suggests that many Nairobi-based five-star hotels underutilize these technologies, leading to operational inefficiencies and weak customer retention (Ministry of Tourism and Wildlife, 2020).

Moreover, the COVID-19 pandemic exposed major digital gaps in Kenya's hospitality sector, as many hotels lacked robust online systems for reservations, customer engagement, and data-driven marketing (WTTC, 2020). The failure to integrate digital innovation effectively has hindered hotels' ability to maintain service quality and adapt to changing customer expectations (Collins et al., 2015). Although research links technological innovation to improved hotel performance globally, limited empirical studies in the Kenyan context have examined how specific digital strategies influence the performance of five-star hotels (Nguyen et al., 2020). Therefore, this study seeks to investigate the relationship between digital innovation strategies and the performance of five-star hotels in Nairobi City County, Kenya.

C. Research Objectives

General Objective

The general objective of the study was to investigate how digital innovation techniques affect the performance of five-star hotels in Nairobi, Kenya.

Specific objectives.

- i. To understand how E Commerce affects the success of five-star hotels in Nairobi, Kenya.
- ii. To determine the impact that IoT has on the success of five-star hotels in Nairobi, Kenya.
- iii. To show how AI impacts the success of 5-star hotels in Nairobi (Kenya).
- iv. To ascertain the effect Big Data has on the success of five-star hotels in Nairobi, Kenya.

2.0 LITERATURE REVIEW

A. Theoretical Framework

Recent attempts to establish a causal relationship between digital innovation initiatives and hotel performance have not been fully compiled. Since then, several research has been carried out both theoretically and practically.

Theory of Innovation Management

The Theory of Innovation Management was introduced by Austrian economist Joseph Schumpeter (1934), who emphasized innovation as the central driver of economic development and business competitiveness. Schumpeter argued that entrepreneurs are catalysts of “creative destruction,” replacing outdated systems with new processes, products, and markets (Hamel, 2006). The theory posits that innovation arises through new product introductions, new production methods, the discovery of new markets, and the reorganization of industries (Balan & Lindsay, 2010; Lawson & Samson, 2001). Innovation management thus enables firms to sustain competitive advantage and achieve long-term performance improvements (Block, 2016). For this study, the theory explains how Nairobi’s five-star hotels can enhance profitability and efficiency by strategically managing digital innovation. It suggests that innovation is not accidental but a deliberate process of creativity, knowledge integration, and market adaptation. The theory is relevant as it underpins the study’s aim to assess how structured digital innovation management influences hotel performance outcomes in Kenya’s hospitality industry.

Diffusion of Innovation Theory

The Diffusion of Innovation Theory, developed by Everett Rogers (1962), explains how new ideas and technologies spread through social systems over time. Rogers (1983) identified four key elements influencing diffusion: the innovation itself, communication channels, time, and the social system. The theory posits that the rate of adoption depends on five innovation characteristics relative advantage, compatibility, complexity, trial ability, and observability (Rogers, 1995). Innovations are more likely to be adopted when they are perceived as beneficial, simple to use, and easily tested (Kunreuther & Pauly, 2012). The theory argues that technological diffusion is essential for organizational growth, particularly in rapidly evolving markets. In the context of this study, it highlights how digital innovations such as artificial intelligence, online booking platforms, and data analytics are adopted by five-star hotels in Nairobi. Its relevance lies in explaining the patterns and factors influencing hotels’ adoption of digital innovation strategies to enhance service quality, operational efficiency, and customer satisfaction.

Theory on Measures of Performance

The Theory on Measures of Performance, advanced by Srimai, Damsaman, and Bangchokdee (2011), emphasizes that performance measurement serves multiple managerial purposes, including control, evaluation, learning, and improvement. The theory posits that no single measure can capture all organizational goals; hence, both financial and non-financial metrics are necessary for comprehensive assessment (Namada, 2017). Earlier models focused mainly on financial outcomes such as profits and return on investment (Marchand & Raymond, 2008; Yalcin, Bayrakdaroglu, & Kahramans, 2012). However, contemporary approaches integrate stakeholder perspectives and strategic objectives, emphasizing customer satisfaction, employee productivity, and innovation outcomes (Serrat, 2010). The theory suggests that effective performance evaluation should align metrics with organizational strategy and operational goals. For this study, it provides a framework for assessing how Nairobi’s five-star hotels measure success through both tangible results and

digital performance indicators. Its relevance lies in guiding the development of balanced digital monitoring methods that reflect financial and service-oriented performance in the hospitality sector.

B. Empirical Review

E-Commerce and Performance in the Hotel Industry

E-commerce has become a core driver of profitability in the hospitality sector by enhancing customer engagement and accessibility. According to Ingham et al. (2015), the challenge for hotels is to appeal to both digital natives and digital immigrants while encouraging online spending. Enginkaya and Yilmaz (2014) note that social media platforms now play a crucial role in shaping consumer awareness and brand loyalty. Following the dotcom crash of the early 2000s, businesses reevaluated online strategies to better understand customer satisfaction and retention (Kim, 2013). The Internet has since become indispensable for hotel operations, linking global suppliers and customers while expanding market reach (Leidner, 2010; Aydin & Savrul, 2014). In the hospitality industry, e-commerce platforms such as Booking.com, TripAdvisor, and Expedia now dominate digital hotel marketing. Over 300 million users access these platforms monthly, influencing booking decisions through reviews and ratings. Hotels that neglect their online presence risk losing visibility and credibility. Therefore, maintaining a consistent digital identity through social commerce and online reputation management is essential. This study examines how Nairobi's five-star hotels leverage e-commerce platforms to enhance brand image, customer loyalty, and profitability. E-commerce provides measurable insights into consumer behavior, enabling hotels to align marketing efforts with financial goals and improve overall performance through digital engagement and strategic online visibility.

Internet of Things (IoT) and Performance in the Hotel Industry

The Internet of Things (IoT) refers to interconnected devices and sensors that communicate and perform automated tasks in real time (Grammatikis et al., 2019). In the hospitality industry, IoT enhances operational efficiency, guest satisfaction, and decision-making by integrating smart technologies into hotel management systems. Industry leaders such as Disney, Marriott, and Hilton have adopted IoT-enabled wristbands and mobile controls to personalize guest experiences (Pizam, 2017). According to Lee (2016) and the National Science Board (2018), IoT can yield both financial and social benefits, improving profitability while enhancing convenience and sustainability. Shinn, Nakatani, and Rodriguez (2017) highlight IoT's capacity to strengthen value chains by streamlining processes and optimizing resources. Similarly, Yan et al. (2018) argue that IoT reduces operational costs and supports differentiation through data-driven insights. In Nairobi's five-star hotels, IoT systems can automate energy management, improve housekeeping efficiency, and personalize services based on guest preferences. Leminen et al. (2018) suggest that integrating IoT into core operations promotes innovation, customer loyalty, and competitiveness. This study explores how IoT strategies influence profitability in Nairobi's luxury hotel sector by assessing their role in enhancing performance metrics such as efficiency, service quality, and

customer retention. IoT adoption thus represents a transformative opportunity for hotels seeking to achieve operational excellence and sustainable growth in the digital era.

Artificial Intelligence (AI) and Performance in the Hotel Industry

Artificial Intelligence (AI) has become integral to improving operational efficiency and guest experience in the hotel industry. From a user's perspective, AI simplifies decision-making and enhances travel experiences through intelligent recommendations and automation (Gretzel, 2011; Tussyadiah & Miller, 2019). Commercially, AI supports productivity, personalization, and marketing strategies (Buhalis et al., 2019). Recommender systems align user profiles with available hotel options, offering tailored experiences (Ricci et al., 2015; Gavalas et al., 2014). Conversational systems such as chatbots and virtual assistants powered by natural language processing facilitate real-time customer interactions through platforms like Siri, Alexa, and Google Assistant (Melián-González et al., 2019). In operations, AI enables predictive maintenance, automates room cleaning, optimizes staffing, and adjusts services based on guest preferences (Miller & Tussyadiah, 2019). Despite its potential, AI remains underutilized in many hospitality contexts, with limited real-world applications beyond pilot projects (Gretzel, 2011). Nonetheless, as AI capabilities expand, they are expected to become essential to hotel management systems, enabling data-driven decisions and improving service delivery. This study investigates how AI adoption contributes to enhanced performance among Nairobi's five-star hotels by improving operational efficiency, personalization, and profitability. The integration of AI into hotel management aligns with global trends toward automation and intelligent systems, positioning AI as a vital strategic tool for competitive differentiation and superior customer experiences in the hospitality industry.

Big Data and Performance in the Hotel Industry

Big data plays a critical role in understanding guest behavior and optimizing hotel operations. The hospitality industry collects vast amounts of data from environmental sources, sensors, and user-generated content (Gunter & Onder, 2016). Information is gathered through wearables, online activity, and travel interactions, enabling hotels to track customer preferences and enhance personalization. Technologies such as GPS, IoT devices, and point-of-sale systems capture offline and real-time data related to guest movements, bookings, and expenditures. According to Li et al. (2018), user-generated content such as online reviews and social media posts, offers valuable insights into customer sentiment. AI-driven analytics can process this data for sentiment analysis, image tagging, and behavioral prediction (Schuckert et al., 2015). When properly harnessed, big data empowers hotels to forecast demand, refine pricing strategies, and improve reputation management. For Nairobi's five-star hotels, big data can support market intelligence, benchmarking, and occupancy forecasting. Integrating big data analytics enables hoteliers to make evidence-based decisions and tailor marketing campaigns to target specific consumer segments. This study examines how big data utilization affects hotel performance by enhancing decision-making, operational efficiency, and profitability.

Digital Innovation Strategies and Performance

Digital innovation strategies have become essential for driving efficiency, competitiveness, and profitability in the hospitality industry. According to Wolna-Samulak (2012), the adoption of information and communication technologies (ICT) enables hotels to enhance productivity, reduce costs, and meet evolving customer expectations. In Nairobi's five-star hotels, management initiatives and staff competency play a central role in implementing digital systems that automate operations and improve service delivery. The automation of hotel processes such as reservation systems, digital payment platforms, and online marketing has strengthened these hotels' reputations for technological excellence. Notably, Hemingway's Nairobi was recognized at the Small Luxury Hotels Awards 2020 for its outstanding digital-driven guest experience (Business Daily Africa, 2020). As digital transformation reshapes global hospitality, user experience increasingly takes precedence over traditional ownership models (Miranda, 2015). Innovative digital strategies such as mobile check-ins, e-payments, and smart room controls enhance convenience and customer satisfaction while streamlining operations.

3.0 RESEARCH METHODOLOGY

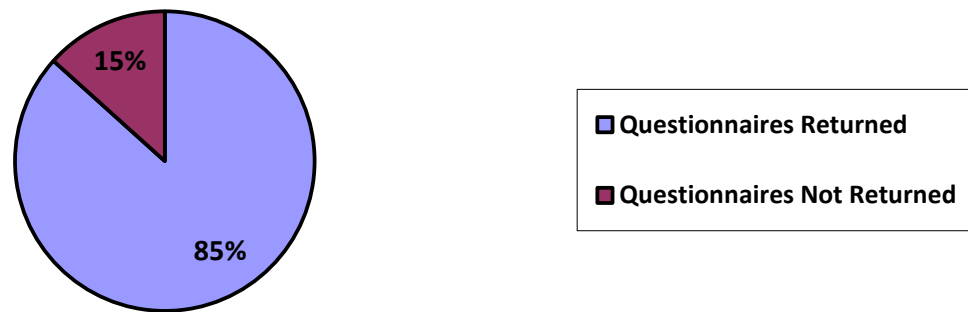
The study employed a descriptive research design to examine the relationship between digital innovation strategies E-commerce, Internet of Things, Artificial Intelligence, and Big Data and the performance of five-star hotels in Nairobi City County, Kenya. The target population comprised 62 managers from ten hotels, while 48 managers were selected through random sampling. Data were collected using structured questionnaires designed to capture hotel-specific and managerial insights, administered electronically via Google Forms and supported by follow-up reminders to enhance response rates. Data were cleaned in Microsoft Excel and analyzed using IBM SPSS, employing both descriptive and inferential statistics. Descriptive analysis summarized data using frequencies, percentages, means, and standard deviations, while multiple regression analysis assessed the influence of the independent variables on hotel performance. Ethical approval was obtained from Kenyatta University and NACOSTI. Participants were fully informed of the study's purpose, participation was voluntary, and strict confidentiality and anonymity were maintained throughout the research process.

4.0 RESEARCH FINDINGS AND DISCUSSION

A. Response Rate

As shown in Figure 4, This result shows an 85% response rate for the questionnaires completed and returned.

Figure 1: Response Rate



Source: Survey Data (2025)

From the sample size of 48 managers, 2 questionnaires were not returned, and 5 of the questionnaires were rejected due to their incompleteness and lack of consistency, rendering them unfit for analysis hence a 85% response rate. Mugenda and Mugenda (1999) suggest that a response rate of 50% is sufficient for analysis and reporting, 60% is considered good, and 70% or higher is regarded as excellent. For these reasons, this response rate is adequate:

B. Descriptive Analysis

Descriptive analysis summarizes collected data to reveal patterns and trends using measures such as frequencies, percentages, and means. It provides an overview of respondents' characteristics and key study variables, enabling the researcher to interpret and present findings in a clear, organized manner.

E-Commerce and Performance.

This study aimed to evaluate how E-commerce influences the performance of five-star hotels in Nairobi City County. A summary of the results is provided in Table 2.

Table 2: Descriptive Statistics for E-commerce and Performance

Statements	Strongly Disagree	Disagree	Moderately Agree	Agree	Highly Agree	Mean	SD
In your opinion, E-commerce platforms have improved customer engagement in your hotel over the past 5 years.	0.0%	0.0%	2.4%	24.4%	73.2%	4.71	0.53
Has the use of online booking systems contributed to better forecasting of customer demand in your hotel?	0.0%	2.4%	4.9%	26.8%	65.9%	4.56	0.7
Do you believe data from E-commerce transactions has enhanced your decision-making in pricing and promotions?	0.0%	2.4%	2.4%	22.0%	73.2%	4.68	0.6
Over the past five years, has online customer feedback through E-commerce platforms helped shape your hotel's service quality?	0.0%	0.0%	0.0%	19.5%	80.5%	4.8	0.4
According to you, online payment options have resulted in faster transactions and improved customer convenience.	0.0%	0.0%	7.3%	24.4%	68.3%	4.75	0.55
Overall Aggregate Score						4.7	0.56

Source: Survey Data (2025)

Survey results show that E-commerce adoption has positively influenced five-star hotel performance in Nairobi, with an overall mean score of 4.70 and SD of 0.56. Most respondents (73.2%) highly agreed that E-commerce improved customer engagement, while 80.5% felt online feedback shaped service quality. Online payments and booking systems were also praised, with 68.3% and 65.9% respectively highly agreeing they enhanced convenience and demand

forecasting. These findings highlight E-commerce's strong role in boosting efficiency and decision-making. These results affirm that E-commerce is no longer just a support tool but a strategic asset in hotel operations. By facilitating faster transactions, improving resource planning, and enhancing customer interaction, E-commerce has enabled hotels to remain competitive and responsive to market demands. The consistency of high scores across all variables highlights a strong endorsement from management-level respondents. In alignment with past studies such as Polychronidou et al. (2014) and Leidner (2010), this research reinforces the idea that E-commerce not only supports internal management but also extends the hotel's reach across global supply and customer networks.

Internet of Things and Performance.

The study sought to investigate the effect of the Internet of Things (IoT) on the performance of five-star hotels in Nairobi City County. The consolidated findings are presented in Table 3.

Table 3 Descriptive Statistics for Internet of Things and Performance

Statements	Strongly Disagree	Disagree	Moderately Agree	Agree	Highly Agree	Mean	SD
During the past five years, contactless services have improved client experience.	0.0%	4.9%	4.9%	24.4%	65.9%	4.5	0.83
Hotel adoption of IoT has reduced costs associated with reservations, front desk, and housekeeping operations.	0.0%	7.3%	4.9%	31.7%	56.1%	4.46	0.87
IoT usage in hotels has increased income and improved one-on-one client interactions.	0.0%	4.9%	4.9%	29.3%	61.0%	4.46	0.85
IoT has led to more customized offerings (e-receipts, remote check-in) and improved guest satisfaction.	0.0%	2.4%	7.3%	24.4%	65.9%	4.56	0.78

Overall Aggregate Score						4.5	0.83
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Source: Survey Data (2025)

The highest level of agreement (**65.9%**) was recorded for the statement that contactless services have improved the client experience reflecting a strong alignment with the expectations of five-star hotels, where seamless and personalized service is essential. This suggests that IoT-enabled contactless technologies are meeting the demands of luxury services. Combined with high agreement levels on cost reduction, increased income, and customized offerings, the results demonstrate that IoT adoption is enhancing both guest satisfaction and operational efficiency key to sustaining five-star excellence. The relatively low standard deviations across all indicators further confirm a consistent and reliable perception among respondents. These insights affirm that five-star hotels are effectively utilizing IoT to deliver premium experiences while streamlining services, as evidenced by the overall high mean score of **4.50**. IoT is thus proving instrumental in reinforcing the luxury, personalization, and efficiency that define the five-star hospitality brand.

Artificial Intelligence and Performance.

This study aimed to evaluate the influence of Artificial Intelligence (AI) on the performance of five-star hotels in Nairobi City County. The summarized results are displayed in Table 4.

Table 4: Descriptive Statistics for Artificial Intelligence and Performance

Statements	Strongly Disagree	Disagree	Moderately Agree	Agree	Highly Agree	Mean	SD
You believe that customers gain a great deal from chatbots' round-the-clock availability, prompt delivery, and range of customized options for making hotel service reservations.	0.0%	4.9%	12.2%	29.3%	53.7%	4.32	0.87
In your perspective, guests receive all-inclusive support from the time of arrival to the time of departure, along with personalized travel and hotel recommendations made after arrival thanks to the hotel's usage of artificial intelligence.	0.0%	2.9%	8.6%	37.1%	51.4%	4.07	1.05

You believe that fewer encounters with hotel staff have occurred as a result of visitors' preferences for more intelligent amenities and services.	2.4%	9.8%	17.1%	31.7%	39.0%	3.95	1.08
Informed suggestions on websites on unique offers has appealed guest needs and elevated guest experiences.	0.0%	7.3%	14.6%	34.1%	43.9%	4.15	0.93
Overall Aggregate Score						4.12	0.99

Source: Author (2025)

The survey results (Mean = 4.12) indicate that AI is positively shaping guest experiences in five-star hotels. Chatbots received the strongest support (Mean = 4.32; 53.7% highly agree), highlighting their value in providing 24/7, customized service. AI-driven personalized support also scored well (Mean = 4.07), as did smart suggestions on offers (Mean = 4.15), showing their role in enhancing guest satisfaction. However, the lower agreement on reduced staff interaction (Mean = 3.95) suggests that personal service remains a key expectation in luxury settings. In conclusion, AI is positively transforming service delivery in five-star hotels. Guests value its speed, personalization, and convenience, but still expect a balance between technology and personal interaction.

Big data and Performance.

The purpose of this study was to examine how Big Data affects the performance of five-star hotels in Nairobi City County. The consolidated findings are provided in Table 5.

Table 5: Descriptive Statistics for Big Data and Performance

Statements	Strongly Disagree	Disagree	Moderately Agree	Agree	Highly Agree	Mean	SD
Big data helps hotel chains tailor services using apps and booking tools.	0.0%	2.4%	7.3%	46.3%	43.9%	4.32	0.71
Hotels use big data to analyze guest behavior,	0.0%	4.9%	9.8%	43.9%	41.5%	4.2	0.81

preferences, and service patterns.							
Big data is used to understand competitors and market offerings.	0.0%	4.9%	12.2%	41.5%	41.5%	4.2	0.83
Customer segmentation using big data fosters better marketing and loyalty.	0.0%	2.4%	9.8%	43.9%	43.9%	4.29	0.74
Overall Aggregate Score						4.26	0.78

Source: Author (2025)

The statement, “Big data helps hotel chains tailor services using apps and booking tools,” recorded the highest agreement level among respondents, achieving a mean score of 4.32, with 43.9% indicating “Highly Agree.” These findings suggest that five-star hotels are effectively leveraging big data to improve digital guest experience, particularly by offering personalized applications, advanced booking platforms, and customized service options. These tools are meeting key guest expectations in luxury hospitality namely convenience, efficiency, and personalization. The relatively low standard deviation (SD = 0.71) reflects a strong consensus among respondents, reinforcing the perception that five-star hotels are using big data effectively to deliver tech-driven, high-quality service experiences.

Performance.

This study sought to determine the extent to which performance is achieved in five-star hotels located in Nairobi City County. The summarized results are shown in Table 6.

Table 6: Descriptive Statistics for Performance

Statements	Strongly Disagree	Disagree	Moderately Agree	Agree	Highly Agree	Mean	SD
Quality services increased repeat business, brand loyalty, and satisfaction.	2.4%	4.9%	12.2%	39.0%	41.5%	4.12	0.97
Employee morale improved due to quality digital solutions.	2.4%	7.3%	12.2%	36.6%	41.5%	4.07	1.02
Surge in cooperation with	0.0%	4.9%	9.8%	39.0%	46.3%	4.27	0.83

OTAs for sales and business.							
Customer retention has increased sales and profit margins.	2.4%	7.3%	14.6%	36.6%	39.0%	4.02	1.02
Online reviews increased hotel awareness and bookings.	4.9%	9.8%	14.6%	36.6%	34.1%	3.85	1.14
Customer reviews impact hotel bookings and performance.	2.4%	7.3%	14.6%	36.6%	39.0%	4.02	1.02
Digital innovation increased hotel exposure and efficiency.	2.4%	4.9%	12.2%	36.6%	43.9%	4.15	0.98
Employees are equipped to operate digital technologies.	0.0%	4.9%	9.8%	36.6%	48.8%	4.29	0.83
Overall Aggregate Score						4.1	0.99

Source: Author (2025)

The table highlights strong agreement that digital innovation boosts five-star hotel performance (Mean = 4.10). Key areas like OTA partnerships (46.3% highly agree) and employee morale improvements (41.5% highly agree) received strong support. Though online reviews saw lower agreement (34.1%), the overall findings confirm that digital tools enhance service quality, efficiency, and customer satisfaction. In conclusion, Respondents believe that digital tools and quality service strategies have strengthened five-star hotels in Nairobi County by enhancing guest satisfaction, sales, and operational efficiency. While traditional service values remain important, embracing innovation is seen as essential for maintaining excellence in five-star hotels in Nairobi City County

C. Regression Analysis

Multiple linear regression analysis assessed the causal relationship between strategic innovation dimensions and NPS organizational performance.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.813a	.662	.622	.396	.662	16.631	4	34	< .001

a. Predictors: (Constant), Big Data, Artificial Intelligence, E-commerce, Internet of Things

b. Dependent Variable: Performance

Source: Survey Data (2025)

This table examines whether the independent variables Big Data, Artificial Intelligence, E-commerce, and the Internet of Things when considered collectively, can predict the performance of five-star hotels, which serves as the dependent variable. The reported R-square value is 0.662, which, when rounded to two decimal places and expressed as a percentage, equals 66%. This indicates that, as a group, these predictors explain 66% of the variance in the performance of five-star hotels in Nairobi City County, Kenya. Overall, the model demonstrates a strong explanatory power, accounting for two-thirds of the performance variation.

Table 8: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.419	4	2.605	16.631	<.001 ^b
Residual	5.325	34	.157		
Total	15.744	38			

a. Dependent Variable: Performance

b. Predictors: (Constant), Big Data, Artificial Intelligence, E-commerce, Internet of Things

Source: Survey Data (2025)

This table illustrates the influence of Big Data, Artificial Intelligence, E-commerce, and the Internet of Things (IoT) on performance, revealing notable findings. The results indicate a strong positive correlation between these digital innovation strategies and performance, with an R value of 0.813. The R Square value of 0.662 shows that 66.2% of the variation in performance is explained by the four independent variables, demonstrating substantial explanatory power an important consideration for data-driven decision-making in hotel management. The Adjusted R Square value of 0.622 further supports the model’s robustness, even after adjusting for the number of predictors and the sample size. Moreover, the F-statistic (16.631, $p < 0.001$) confirms that the model is statistically significant, indicating that the combined influence of these digital innovation strategies has a meaningful impact on the performance of five-star hotels in Nairobi City County. The findings clearly demonstrate that use of Big Data, AI, E-commerce, and IoT plays a significant role in enhancing performance. In the context of five-star hotels, these technologies are not just supportive tools, they are strategic assets driving efficiency, innovation, and competitive advantage.

Table 9: Coefficient

Model	Unstandardized Coefficients (B)	Unstandardized Coefficients (Std. Error)	Standardized Coefficients (Beta)	t	Sig.	Tolerance	VIF
(Constant)	.632	.751		.842	.406		
E-commerce	-.359	.152	-.261	-2.366	.024	.820	1.219
Internet of Things	.158	.236	.270	.669	.508	.061	16.412
Artificial Intelligence	.047	.232	.082	.204	.840	.062	16.164
Big Data	1.011	.143	.763	7.049	<.001	.848	1.179

a. Dependent Variable: Performance

Source: Survey Data (2025)

This regression analysis explores how E-commerce, Big Data, Artificial Intelligence (AI), and the Internet of Things (IoT) influence performance in five-star hotels. $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$

$$Y = 0.632 + (-0.359) X_1 + 0.158X_2 + 0.047X_3 + 1.01X_4 + \epsilon$$

Where ; Y= Performance

$$\beta_0 = \text{Constant (0.632)}$$

$$\text{Beta Coefficients} = (-0.359, 0.158, 0.074 \text{ and } 1.01)$$

$$X_1 = \text{E-commerce}$$

$$X_2 = \text{Internet of Things}$$

$$X_3 = \text{Artificial Intelligence}$$

$$X_4 = \text{Big Data}$$

$$\epsilon = \text{Error Term}$$

Big Data emerged as the most influential factor in driving performance ($\beta = 0.763, p < 0.001$). This suggests that five-star hotels that actively leverage big data for guest analytics, market trends, and operational insights experience significantly enhanced performance. Big Data likely supports better decision-making, personalization, and efficiency. E-commerce shows a statistically significant negative relationship with performance ($\beta = -0.261, p = 0.024$). This may indicate that current e-commerce strategies (such as booking platforms or digital sales systems) in five-star hotels are inefficient, poorly integrated, or not delivering the expected value. It suggests a need for improved online service quality or more intuitive guest platforms. While both AI ($p = 0.840$) and IoT ($p = 0.508$) are included in the model, their individual contributions to performance are not statistically significant. Additionally, both exhibits very high multicollinearity ($VIF > 16$),

meaning their effects may be overlapping with other predictors (possibly Big Data). Their impact might be more indirect or masked by how closely they're linked with broader digital systems.

In conclusion, the findings highlight Big Data as a key driver of performance in five-star hotels in Nairobi city county, reinforcing its role in powering innovation, efficiency, and guest satisfaction. Conversely, E-commerce systems may be underperforming and require strategic improvements. Although AI and IoT are valuable technologies, their isolated effects are not yet evident possibly due to overlapping functionality or limited deployment, therefore Further research is needed to explore how these technologies are being implemented, integrated, and utilized in five-star environments to better understand their unique contributions to performance

5.0 SUMMARY OF THE STUDY

This study examined digital innovation strategies as predictors of performance within five-star hotels in Nairobi City County, Kenya's premier hospitality establishments responsible for delivering world-class accommodation, dining, and guest experiences. Digital innovation was operationalized through four dimensions: E-commerce, Internet of Things (IoT), Artificial Intelligence (AI), and Big Data analytics, while hotel performance was measured using customer engagement, operational efficiency, service quality, and profitability indicators. Correlation analysis revealed that Big Data exhibited the strongest statistically significant relationship with hotel performance ($\beta = 0.763$, $p < 0.001$), while E-commerce showed a significant negative relationship ($\beta = -0.261$, $p = 0.024$). IoT and AI showed positive but non-significant individual contributions, likely due to high multicollinearity. Regression analysis demonstrated that digital innovation strategies collectively explained 66.2% of performance variance ($R^2 = 0.662$), with the model proving statistically significant ($F = 16.631$, $p < 0.001$). These findings confirm that digital innovation, particularly Big Data analytics, significantly enhances five-star hotel performance. However, the indirect effects of other innovation dimensions suggest mediation through implementation quality, staff competency, and technological integration capabilities, indicating that 33.8% of performance variance remains influenced by factors including organizational culture, management support, and resource adequacy.

6.0 CONCLUSION

Digital innovation strategies play a critical role in enhancing five-star hotel organizational performance in Nairobi City County. Big Data analytics, which emerged as the most significant predictor, improves decision-making, guest personalization, and operational efficiency through comprehensive data-driven insights. E-commerce, though statistically significant, showed a negative relationship with performance, suggesting that current online booking platforms and digital sales systems require strategic improvements in integration, user experience, and service quality delivery. Internet of Things innovation, while not directly significant due to multicollinearity, influences performance through enhanced contactless services, automated operations, and customized guest offerings that improve satisfaction and reduce operational costs. Artificial Intelligence innovation similarly contributes indirectly by enabling chatbot services, personalized recommendations, and intelligent amenities, though its isolated effect remains masked by overlap with broader digital systems. The regression model confirmed that all four digital innovation dimensions collectively and significantly predict hotel performance, explaining two-thirds of the variance. Sustaining competitive advantage requires deliberate investment in big

data infrastructure, improved e-commerce platforms, continuous staff training in digital technologies, and strategic integration of IoT and AI systems to strengthen five-star hotels' effectiveness in addressing Kenya's evolving hospitality market demands.

7.0 RECOMMENDATIONS

Five-star hotels in Nairobi should invest heavily in big data analytics platforms and data literacy training programs for management and staff across all departments. E-commerce systems require urgent strategic overhaul, focusing on seamless integration, enhanced user interfaces, and improved online-to-offline service continuity alongside guest experience optimization initiatives. IoT deployment and AI adoption must be prioritized through comprehensive implementation frameworks that address technical integration challenges and staff competency gaps. Flexible organizational structures should facilitate cross-departmental collaboration between IT, operations, and guest services departments to maximize digital innovation benefits. Service delivery models emphasizing personalized digital experiences, mobile applications, and real-time guest feedback systems require expansion and continuous improvement. Management frameworks should institutionalize digital innovation within performance appraisal systems, establishing dedicated digital transformation units with clear innovation mandates and adequate budgets. Hotel ownership and management groups must prioritize resource allocation toward technological infrastructure, automation investments, and continuous innovation initiatives to ensure sustainability and competitive differentiation across Nairobi's luxury hospitality sector.

8.0 AREAS FOR FURTHER RESEARCH

Future studies should explore how leadership styles, staff digital competence, organizational culture, and financial resources influence hotel performance. Researchers should also examine mediating variables like training, ICT infrastructure, and guest profiles. Comparative and longitudinal studies across different hotel categories and East African markets would enhance understanding and theoretical refinement.

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